Appendix A
Summary of NOP Comments

ESA

Coast Highway Corridor Study Project NOP Comments (Received June 1 - July 1, 2016)						
Reference #	**Date:**	**Name**	**Group/Association/Agency**	**Comment Format**	**Category**	**Summary of Comments**
1	6/23/2016 6/28/2016	Dirk Ackema	Water Works Filtration Systems	Email and Oral Comment	Traffic, Aesthetics, Project Description	1. Two lanes of vehicle traffic in each direction should remain throughout the PCH corridor. 2. Right hand traffic lanes should be designated as shared bicycle lanes with vehicle traffic. 3. Speed limit throughout the PCH corridor should be limited to 30 mph. 4. 'Bump-outs' should be created at most intersections for aesthetic and safer turning purposes. 5. Parallel parking should be reduced but allowed in certain areas. 6. City owned or private parking lots, which would require payment, should be provided in certain areas to relieve parking problems. 7. Decorative medians should define turning lanes at intersections with street names posted on "historic City of Oceanside' signs. 8. Roundabouts should not be considered to replace existing traffic signals. 9. Flashing crosswalks installed at strategic pedestrian locations. 10. Bus pullouts should be provided at all bus stops. Wants to see a shared bicyclist/vehicle lane in Coast Highway and to implement traffic calming measures to make it safer for bicyclists. Rail Trail and Pacific Street more enjoyable to bike on for the normal bicyclists. Maintain two lanes of traffic in both directions on Coast Highway.
2	6/30/2016	Dianna Bailey	Individual	Email	Project Description	Concerned the constant flow of the roundabout will prove difficult for businesses to provide services to their customers.
3	6/30/2016	Colleen Balch	Individual	Email	Public Safety, Project Description	Concerned about effects on the Fire Department, businesses, and residential. Mentions how the proposed project fails to address citizen-requested addition of more sidewalks, especially in So. O.
4	6/23/2016	Joan Bockman	Individual	Oral Comment	Traffic, Land Use, Project Description	Buena Vista Audubon requests a crossing across the nature preserve in the southern end of the corridor. Supports changing businesses and allowing for new types of land uses to be included in the corridor. Problem with traffic is the speed not the volume and need a free flow traffic system but with lower speed and traffic calming measures. Supports the use of roundabouts. States that pedestrians don't cross within the roundabouts but before cars enter roundabouts.
5	7/6/2016	Caltrans (John Armstrong)	Agency	Letter	Traffic, Project Description	Caltrans states that a traffic impact study (TIS) is necessary to determine the project's near-term and long-term impacts to State facilities, both existing and proposed, and to propose mitigation measures, as appropriate. In addition, the TIS should provide project distribution analysis with and without project for I-5. It is recommended that Caltrans relinquish state right-of-way (ROW) within the project's roundabout located at the SR-76 intersection. Caltrans ROW should be reset outside of the proposed roundabout so the City will have complete control and maintain this facility; however, if this roundabout stays within Caltrans ROW, further analysis will be required based on Caltrans Intersection Control Evaluation (ICE) policy. Any work performed within Caltrans ROW will require discretionary review and approval by Caltrans and an encroachment permit will be required for any work within the Caltrans ROW prior to construction. AS part of the encroachment permit, the City must provide an approved final environmental document including the CEQA determination addressing any environmental impacts within the ROW and corresponding technical studies.
6	6/30/2016	Pam Chambers	Individual	Email	Traffic, Public Safety, Project Description	Fears the change of lanes will cause traffic to expand from Coast Highway to the streets and neighborhood of South O. It would "change the flavor" of the neighborhood and put people at risk of traffic accidents. "What will the city council do when one or more children are killed on their neighborhood streets by the overflow traffic from Coast Highway. Will they then increase the lanes back to 4?"
7	6/23/2016	Penny Cormails	Individual	Oral Comment	Traffic, Project Description	Suggests the Vista Way should be in the study area as it's a main connector to Coast Highway. States that Vista Way is currently operating at LOS F with large amounts of congestion and back up, which is especially annoying for residents of that street. Vista Way is a finger-pointing street as CALTRANS' jurisdiction is at the end of the street but still in the city of Oceanside.
8	6/23/2016	Kevin Edwards	Individual	Oral Comment	Traffic, Emergency Access, Project Description	The EIR needs to analyze the freeway expansion at Oceanside Boulevard and Morse St. as it will take away Cassidy off-ramp and increased emergency vehicle access and response times with the decrease in lanes and the SPRINTER line. Also stated that Vista Way down to the Lagoon is currently one lane and is packed during the summertime.
9	6/23/2016	Richard Fox	Individual	Oral Comment	Traffic, Project Description	The project needs to address taking away parking Pier View to Seagaze, as it is a critical area. Suggests adding parking lots or some other method of taking cars off the street. The pilot area is not a typical part of Coast Highway as it had four lanes with bicycle lanes and parking. With reduction to one lane, the businesses don't have alleys and has resulted in increased time to get out of driveways (5 or 6 mins usually and max of 11 minutes).

Coast Highway Corridor Study Project NOP Comments (Received June 1 - July 1, 2016)						
Reference #	**Date:**	**Name**	**Group/Association/Agency**	**Comment Format**	**Category**	**Summary of Comments**
10	6/23/2016	Nancy Gregory	Individual	Oral Comment	Traffic, Project Description	The commenter doesn't support reduction in lanes as it stresses the roadway and pushes traffic onto side streets; wants to keep cars on the main road and keep surrounding streets for less cars. Doesn't think bicycle would be the main transportation method as empty bike racks around the city demonstrate and Coast Highway should not be reduced to cater to bikes.
11	6/23/2016	Jon Hall	Individual	Oral Comment	Traffic, Public Safety, Project Description	The commenter expresses concern about roundabouts and safety of bicyclists and ensure that roundabout are wide enough for bicyclists. Keep Coast Highway at four lanes with roundabouts and finish the Rail Trail for bicyclists.
12	6/23/2016	Elizabeth Jones	Individual (on behalf of St. Malo Home Owners Association)	Oral Comment	Traffic	Asked about the area and roadways that would be analyzed in the EIR.
13	6/23/2016	Norman Kelley	Individual	Letter	Project Description	Believes the city is planning to turn Coast Hwy into a semi-pedestrian mall. Concerned with bikers mixing in with drivers. Says reverse parking experiment on mission is counter intuitive. "Oceanside is not Amsterdam."
14	6/23/2016	Jimmy Knot	Individual	Oral Comment	Public Safety, Project Description	Permanent RV Park owner and speaking on behalf of shop owners that can't make it to meetings at night. Need crosswalk on Coast Highway to reduce accidents and fatalities and allow for safe crossing of the highway.
15	7/1/2016	Carolyn Krammer	Individual	Email	Public Safety, Project Description	Concerns about how public safety (police and firefighters) will be able to get through traffic with lane reduction/roundabout added. If there will be a continuous flow of traffic when stopped at RR crossings. How will the adjacent neighborhoods and businesses throughout Coast Hwy be affected by the lane reductions and loss of parking. Accessibility concerns. Wants to know when Rail Trail will be completed.
16	6/23/2016	Nathan Lovell	Individual	Oral Comment	Traffic, Public Safety, Project Description	Appreciates the inclusion of bicycle lanes and the increased safety of bicyclist and states that younger crowd and new business would attract more bicyclist. Bicycle lanes prevents bicyclists from getting hit by cars and car doors and provides more room to pull over for emergency vehicles. Requests that project looks at how bicyclists merge into roundabouts and providing a safety route for bicyclist. Suggests a class for public to learn how to drive in roundabouts. Supports the Rail Trail as it's a safer route for bicyclists.
17	6/29/2016 6/30/2016	Shari Mackin	Individual	Emails	Public Health, Air Quality, Traffic, Project Description	Would like to see a number of impacts studied. Wants to know the benefits of the roundabout and how people will be able to cross the street if no one will stop for pedestrians currently. Impacts around the Point Loma "dip" in regards to business, residents, and others. Landscaping concerns involving male trees creating pollen that causes allergies. Freeman St., Alvarado, and Cassidy: currently, it is unsafe to turn onto or cross Cassidy from Freeman and Alvarado Streets due to street parking which blocks views of eastbound/westbound traffic and Tremont, Broadway, and Cassidy: currently, it is unsafe to turn onto or cross Cassidy from Tremont and Broadway due to street parking which blocks views of eastbound/westbound traffic. If a roundabout is installed at Cassidy, this will increase the non-stop flow of traffic on Cassidy. How will the proposed roundabouts and street parking effect people trying to get across Cassidy at these two points? Mentions bikers and the "flow" of the roundabout.
18	6/23/2016	Jane Manshau	Individual	Oral Comment	Project Description	A member of the steering committee. Supports seeing improvements to Coast Highway and want to see it as a drive to destination rather than a drive through destination to benefit the businesses. Concerned about increased side street traffic with reduction in lanes, which increases pedestrian and bicyclists hazards, and would like traffic calming measures to occur now, even as a phases.
19	6/23/2016	Bob McCollugh	Individual	Oral Comment	Traffic	Traffic has currently increased and parking problems within South Freidman neighborhood. How can a reduction in lanes handle the increase in population, especially in South Oceanside.
20	7/1/2016	Amanda Merz	Individual	Email	Code Enforcement	A need for more code enforcement on the normal work days (Mon-Fri), but also on weekends when there is no one monitoring. Garbage from unmonitored Saturday swap meet creates safety issue for cars and pedestrians. Reporting problems require an exact address/location, making it difficult for reports to be made.

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Reference #	**Date:**	**Name**	**Group/Association/Agency**	**Comment Format**	**Category**	**Summary of Comments**
21	6/23/2016 6/29/2016	Beatrice Moniz	Individual	Comment Sheet and Email	Traffic, Public Safety, Project Description	There is a need to beautify the area by removing weeds, adding landscape, and making parking more inviting for people. The project/EIR should include the following: keep 4 lanes; take into account the freeway changes and how taking out Cassidy will impact freeway access; emergency access will be limited; finish rail trail for bicycles; parking; egress/ingress on Morris St. Also, if the City wants to be a destination and not a thoroughfare, then should focus on the east/west streets, like Mission and Pier View, and should start with the area where the street fair would be.
22	6/23/2016 6/27/2016	Pete Penseyres	Individual (representing O'Side Bike Walk Committee)	Email, Oral Comment	Project Description, Greenhouse Gas, Traffic, Project Description	1. Should the roadway enhancements to include continuous Class 2 Bike Lanes throughout the corridor reference how they comply with AB 1358, The Complete Streets Act? 2. Should the installation of single lane roundabouts in place of traffic lights and at other intersections reference how they comply with AB 32, The Global Warming Solutions Act? 3. Can the educational instructions provided in the attached flyer approved by the San Diego County Bicycle Coalition be considered in any discussion of safety, education, and environmental issues within the DEIR? 4. The Roundabout Guidelines provided by the FHWA in Publication No. FHWA-RD-00-067, pages 73-76 includes methods for estimating the safety, operational and environmental advantages of roundabouts vs. traffic lights. For example the estimated cost of crashes (Exhibit 3-19 on page 74) lists the cost of a single fatality at almost $1 million in 1997 dollars. Can this information be referenced and used in any cost/benefit analysis in the DEIR? States that Oceanside offers free bicyclists class, which teaches how to ride your bike through a roundabout. Suggest public education program to educate people on how to drive through roundabouts.
23	6/23/2016	Mary Ellen Reese	Individual	Comment Sheet and Oral Comment	Traffic, Biological Resources, Project Description	1. Does the EIR include south of Vista on Pacific Coast Highway to Lagoon? Will the EIR consider any impact on the Lagoon? 2. Parking lots towards beach at Cassidy. 3. Questions why the pilot study is located at a segment that doesn't have businesses that people shop in and walk around. Not a good representation of the corridor and should be the last phase not the first. Should start in the north (Pier View to Seagaze) then gradually work its way down to Wisconsin. 4. Don't need 8' bike lanes but suggests 6' bike lanes with effective bumps between the bike lanes and road/cars. Should look at the Rail Trail to satisfy bicycle needs within in the City. 5. South Oceanside shouldn't be reduced to 2 lanes as it will affect residents with zero benefits. Why starting with Morse to Oceanside Boulevard segment as this segment has the least amount of advantages. Vista Way, Cassidy and Oceanside Boulevard are main entry roads into the downtown area. Need the Rail Trail to San Clemente to provide adequate facilities to bicyclists. Start at the North part of the corridor and if the project works then extend south as this approach allows for the most advantages.
24	6/23/2016	Meridee Johnson Reynolds	Individual	Oral Comment	Public Safety, Noise, Project Description	Business owner along segment of Coast Highway from Vista Way and Kelly, which doesn't include alleys. Planning Commission stated didn't want the type of business in Oceanside anymore. However, without alleys, semis that bring merchandise to businesses along this segment would have to park in Coast Highway and block traffic for about 45 minutes. Concerned about how semis and bicyclists/pedestrians will use roundabouts and worried about the safety of roundabouts. Stated the transitioning out automotive uses over the last 30+ years as move to more gentrified downtown area. Also, automotive uses generate large amounts of noise that are annoying to surrounding residents.
25	6/23/2016	Mike Robinson	Individual	Oral Comment	Project Description	Bicyclists should be taken off the roads and put on the Rail Trail or safety region
26	6/23/2016	Cole Sampson	Individual	Oral Comment	Public Safety, Traffic, Project Description	RV Park business owner. Suggests sharrows within the design for the Coast Highway to share the lane with both vehicles and bicyclists. Current problem of turning out of driveway as there is no break in traffic to get out into street and safety hazards. Concerned with design of roundabouts to get RVs through and increased use of side streets, which is more residential. States that all businesses should be created equal and should not be run out of town. Ambulances stuck at Morse St. when the SPRINTER is going pass and should also analyze intersections for emergency vehicles.

Coast Highway Corridor Study Project NOP Comments (Received June 1 - July 1, 2016)						
Reference #	**Date:**	**Name**	**Group/Association/Agency**	**Comment Format**	**Category**	**Summary of Comments**
27	7/1/2016	SANDAG (Susan Baldwin)	Agency	Letter	Project Description	SANDAG states that all comments are based on policies included in the San Diego Forward: The Regional Plan and are submitted from a regional perspective to emphasize the need for land use and transportation coordination and to implement smart growth and sustainable development principles. Per Smart Growth, SANDAG strongly encourages that the project acknowledges and facilitates access to public transit services, such as the COASTER, SPRINTER and local bus routes. Per Long Range Transportation, SANDAG encourages the City to reference and consult the Local Complete Sample Checklist, which serves as a tool that can be adapted to meet specific goals as the city plans and builds new transportation projects. Further, the federal regulations guiding the SANDAG Congestion Management Process requires that the city demonstrates the project performed a multi-modal analysis when selecting a preferred alternative. Per Transportation Demand Management, SANDAG supports the parking and transportation demand management strategies in the Coast Highway Vision Strategic Plan and suggests they be reflected in the project. Bikeshare services and other bike amenities should be explored along the corridor along with public outreach for bicycling. Further, schools should consider participating in the Walk, Ride and Roll to School mini-grant and educational program. SANDAG also recommends the following considerations: SANDAG regional parking management toolbox, San Diego Bike Plan, Regional Multimodal Transportation Analysis, Planning and Designing for Pedestrians, Designing for Smart Growth, Trip Generations for Smart Growth, and Parking Strategies for Smart Growth. Finally, SANDAG requests the Draft EIR be sent to them.
28	6/23/2016 6/30/2016	Nadine Scott	Friends of Loma Alta	Email and Letter, Oral Comment	Traffic, GHG, Aesthetics, Hazards	"Please incorporate our comments and concerns into the EIR study. Note that we would like to prioritize the meeting with Caltrans in order to determine if they are likely to support or oppose, particularly in light of Coast Highway being a designated alternative route during I-5 traffic issues. It doesn't seem justified to spend tons of money on studies if this is going to be a prohibited change to Coast Highway." Concerns with safety, traffic, GHG emissions, public safety, and the impacts lack of adequate parking will have on businesses. Traffic analyses need to be done on the I-5 on given days and times. A face-to-face consultation with Caltrans needs to be made about their decision to use the Coast Highway as an alternative route for I-5 congestion. Analyze NCTD bus and train crossings. Analyze public safety. Analyze safety benefits for families and children the roundabout will have. Discuss fiscal impacts. Analyze after-project traffic potentials. Suggest the a parking demand study and emergency response time study be prepared with the project. Also, need to analyze the damage to emergency vehicles if they need to jump the roundabouts. EIR needs to analyze the stopping of traffic on Coast Highway from delivery vehicles and disabled vehicles. Need to use most current SANDAG models and need alternatives to the proposed lane diet. EIR needs to state land use development and population capacities for the City and need to adjust the SANDAG models as projections are too high. Should be studying Oceanside Boulevard and Vista Way, especially in conjunction with I-5 blockages. Need to publicize that parking would be reduced in South Oceanside. Need to study surrounding neighborhoods and provide alternatives to the lane diet. Supports beautification.
29	7/1/2016	Lisa Skyles	Individual	Email	Public Safety, Project Description	"How will Police and Fire navigate if lanes are reduced? How will residential streets be protected from commercial traffic? How will angled parking improve traffic flow along PCH with only one travel lane in each direction instead of the two we have on Mission Avenue? How do visually impaired individuals navigate crossing PCH without the signals currently found at crossings? How will parking in “the Dip” benefit the patrons and businesses located south of Morse Street?" etc.
30	6/23/2016	Unknown	Individual	Comment Sheet	Traffic, Project Description	Beautify the Coast Hwy; take a look at bike lanes; no roundabouts; keep four lanes; take freeway into account; Rail Trail; public safety at risk; etc.
31	6/23/2016	Unknown	Individual	Oral Comment	Project Description	Look at city of San Clemente that moved bicyclist lanes/routes into the residential neighborhoods to increase safety and still allow streets for cars.
32	6/30/2016	Alicia Webb	Individual	Email	Project Description	Suggests the Coast Hwy saves one lane for a shared bike lane with a green line painted as a cheaper alternative. Wants more speed limit and stop signs put up, because they have seen cars going 50/60mph. Vista Way needs attention given to its crosswalk. Thinks a roundabout would help.
33	6/23/2016	Elizabeth West	Individual	Oral Comment	Project Description	Concern that South Oceanside would turn into Pacific Beach with too many bars/booze places and maintain residential character. North end is more touristy and respect integrity of the various areas of the corridor and neighborhoods.

Coast Highway Corridor Study Project NOP Comments (Received June 1 - July 1, 2016)						
Reference #	**Date:**	**Name**	**Group/Association/Agency**	**Comment Format**	**Category**	**Summary of Comments**
34	6/23/2016	Joel West	Individual	Oral Comment	Traffic, Project Description	Bike and pedestrian trips account for less than five percent of vehicle trips and not the most used transportation method in the city. States that the project should capture that the solution for South Oceanside is not necessarily the same as the solution for North Oceanside. Public education would not be effective on the large portion of tourists that use the City's roadways and used example of a confused driver stopping in a roundabout on the railroad tracks at Broadway and Cassidy. Concern that roundabouts would be confusing and not necessary for the intersections off of Coast Highway and wants to know how the intersections for roundabouts were picked. Also, wants to know the calibration for bicycle models as might take traffic off Coast Highway and add traffic on Pacific Street (South of Oceanside Boulevard), which is nicer to bike on.
35	6/10/2016 6/14/2016	Pechanga Band of Luiseño Indians	Tribe	AB52/SB18 Consultation Request	Cultural Resources	The tribe will assist the city of Oceanside in determining the type of environmental document appropriate for the project, identifying potential tribal cultural resources (TCRs), determining whether potential substantial adverse effects would occur, and to develop appropriate preservation, avoidance, and/or mitigation measures. The tribe's preferred TCR mitigation is always avoidance and the tribe requests that all efforts to preserve sensitive TCRs be made as early as possible. The tribe requests being added to the distribution list for public notices and circulation of all project documents and to be notified of all public hearings and scheduled approvals for the project. The project is located within the tribe's aboriginal territory with extensive tribal cultural ties to this area of the city of Oceanside. The tribe request to be sent copies of all available reports and plans as soon as they are available so the tribe may review them before any meetings.
36	6/16/2016	Pala Band of Mission Indians	Tribe	AB52 Consultation Request	Cultural Resources	The tribe states that the project is not located within the boundaries of the recognized Pala Indian Reservation but is within the boundaries of the tribes Traditional Use Area or is situated in close proximity to the reservation. Due to the location of the project, information generated by the project would likely be useful in better understanding regional culture and history.
37	6/20/2016	San Luis Rey Band of Mission Indians	Tribe	AB52/SB18 Consultation Request	Cultural Resources	The tribe requests formal consultation under both the SB18 and AB52 consultation processes. The tribal letters state that the project is within the tribe's traditional territory and the tribe is resolute in the preservation and protection of cultural, archaeological and historical sites within their traditional territory. The tribe urges caution in assessing the land encompassing the project for development purposes and requests that a Luiseño Native American monitor be present during any evaluation of potential impacts to cultural resources within the project boundaries. The tribe also requests consultation regarding the following issues: project alternatives, mitigation measures, significant project effects to tribal cultural resources, and the significance of tribal cultural resources. Additionally, the tribe would like to be sent any cultural resources or other assessments completed as part of the project or includes part of the project's potential area of project effect (APE). Finally, the tribe states that preservation in place is the preferred manner of mitigating impacts to archaeological sites.
38	6/23/2016	Rincon Band of Luiseño Indians	Tribe	AB52/SB18 Consultation Request	Cultural Resources	The tribe states that the project is located within the historic Luiseño Territory and is also situated within Rincon's specific area of cultural interest. Since the project is located within the tribe's Traditional Use Area, there is potential of inadvertent cultural findings at the project location. The tribe recommends a Native American monitor be present during all ground disturbing activities.

Appendix B
Visual Corridor Assessment

ESA

PLANNING DIVISION

M E M O R A N D U M

DATE: September 18, 2018

TO: Coast Highway Corridor Study (Project File)

FROM: Russ Cunningham, Principal Planner

SUBJECT: Coastal View Corridor Assessment for the Coast Highway Corridor Study Environmental Impact Report

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On October 5, 2017, the California Coastal Commission (CCC) submitted formal comment on the Draft EIR for the Coast Highway Corridor Study that calls out potential impacts to coastal view corridors occasioned by intersection improvements on Coast Highway. Specifically, the CCC correspondence expresses concern that above-grade improvements associated with new traffic roundabouts at 12 Coast Highway intersections could impede existing public views of the ocean and coastline.

Most of the City's designated coastal view corridors lie within local roadways that run perpendicular to the coastline and extend to the beach. Identified in the mid-1980s as part of the development of the City's initial Local Coastal Program (LCP), these view corridors are shown in an exhibit appended to this memorandum as Attachment 1. While most of these corridors continue to provide visual access to the ocean from the public right of way, the extent and quality of visual access varies considerable from corridor to corridor.

To illustrate for CCC staff and other interested parties the current status of each of the designated coastal view corridors, City staff has prepared an analysis of the visual quality of each corridor. The analysis ranks the quality of visual access in each view corridor, based on the openness of the view and the degree to which it is compromised by features like buildings, signage, landscape, railroad improvements, etc. Based on these criteria, visual access in each corridor is ranked as minimal, limited, good, or exceptional. The

analysis includes photographs taken at each Coast Highway intersection identified as having the potential to accommodate a roundabout. These photographs show visual access from the cross-street pedestrian crossings on the inland side of Coast Highway.

The view corridor analysis and associated photographs support the City's position that intersection improvements under 36 inches in height will not impede existing public views of the ocean within the designated coastal view corridors. The analysis also supports further assessment of those intersections where taller installations may be appropriate, given the absence of a coastal view or the possibility of framing a coastal view with landscape or other decorative features. Should the proposed Coast Highway right-of-way improvements be approved, the analysis will provide a starting point for determining how to design and locate these improvements to avoid impacts to both existing and potentially restored coastal views within the Coast Highway Corridor.

Coast Highway
Ocean View Corridor Analysis
January 2, 2018

City of Oceanside Local Coastal Program (LCP)
(View Corridor Exhibit)

View Quality Categories

- Minimal
  - Ocean not immediately discernible
  - View does not fully extend laterally across the entire corridor (i.e., public right-of-way)
  - Public right-of-way does not extend through to the ocean
- Limited
  - View significantly impeded by structures and/or other improvements
  - View does not fully extend laterally across the entire corridor (i.e., public right-of-way)
- Good
  - View largely extends across the entire corridor (i.e., public right-of-way)
  - Few impediments within the corridor
- Exceptional
  - Panoramic views
  - Elevated vantage points



Buena Vista Lagoon

Ocean View: None

Impediments: Vegetation; railroad trestle; residential uses

Roundabout: No



Cassidy Street

Ocean View: Limited

Impediments: Pedestrian bridge; railroad signals; street signage

Roundabout: Yes



Loma Alta Creek

Ocean View: Minimal

Impediments: Landscape; railroad trestle

Roundabout: No



Oceanside Boulevard

<u>Ocean View</u>: Limited

<u>Impediments</u>: Train signals; traffic signal; parked cars; vegetation; commercial uses

<u>Roundabout</u>: Yes



Eucalyptus Street

Ocean View: Minimal

Impediments: Industrial uses; vegetation; power lines

Roundabout: Yes



West Street

Ocean View: Limited

Impediments: Residential uses; power lines

Roundabout: Yes



Leonard Street

Ocean View: Limited

Impediments: Residential uses; vegetation; power lines

Roundabout: Yes



Wisconsin Avenue

Ocean View: Limited

Impediments: Roadway orientation; commercial and residential uses; railroad signals; vegetation; parked cars

Roundabout: Yes



Minnesota Street

Ocean View: Minimal

Impediments: Residential uses; vegetation; power lines

Roundabout: Yes



Washington Street

Ocean View: Minimal

Impediments: Residential uses; vegetation; power lines

Roundabout: Yes



Missouri Street

Ocean View: Minimal

Impediments: Residential uses; bicycle facilities; railroad improvements; street lighting; power lines; street signage

Roundabout: Yes



Michigan Street

Ocean View: Limited

Impediments: Residential uses; vegetation

Roundabout: Yes



Topeka Street

Ocean View: Minimal

Impediments: Residential uses; vegetation

Roundabout: Yes



Seagaze Street

Ocean View: Good
Impediments: Public parking; vegetation; street lighting; street signage
Roundabout: No

Notes:

a) Ocean views in this corridor are currently impacted by temporary construction trailers, fencing, and heavy-duty vehicles.
b) Some of the view corridor will be compromised by approved development (e.g., Lot 21 mixed-use, pier resort hotel).



Mission Avenue

Ocean View: Good

Impediments: Traffic signal; street signs; railroad signals; street lights; vegetation

Roundabout: No



Pier View Way

Ocean View: Good

Impediments: Traffic signal; street signs; railroad signals; street lights; vegetation

Roundabout: No



Civic Center Drive

Ocean View: Minimal

Impediments: Residential uses; vegetation

Roundabout: Yes



Sportfisher Drive

Ocean View: Minimal

Impediments: Residential uses; vegetation

Roundabout: Yes



Surfrider Way

Ocean View: Good

Impediments: Vegetation; street signs

Roundabout: Yes



Windward Way

Ocean View: Minimal

Impediments: Residential uses; vegetation

Roundabout: Yes



Neptune Street

Ocean View: Limited

Impediments: Vegetation; street signage; power lines

Roundabout: Yes



Costa Pacifica

Ocean View: Good

Impediments: Residential uses; railroad trestle; street median

Roundabout: No



Coast Hwy @ SLR River (South)

Ocean View: Exceptional

Impediments: Residential and public uses; vegetation

Roundabout: No



Coast Hwy @ SLR River (North)

Ocean View: Exceptional

Impediments: Residential and public uses; vegetation

Roundabout: No

Appendix C1

Supplemental Air Quality and GHG Emissions Technical Memo (2018)

ESA

ESA

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San Diego, CA 92101
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memorandum

date	October 10, 2018
to	City of Oceanside, Engineering Division
from	Joza Burnam, ESA Alan Sako, ESA
subject	Coast Highway Corridor Study Project – Supplemental Air Quality and Greenhouse Gas Emissions Technical Memorandum

Introduction

In February 2017, Environmental Science Associates (ESA) analyzed the potential air quality and greenhouse gas (GHG) effects of the City of Oceanside Coast Highway Corridor Project (proposed project, or project) and presented the results of the analysis in the 2017 Air Quality and Greenhouse Gas Emissions Technical Report, hereinafter referred to as the 2017 AQ/GHG Report (ESA 2017). Since the 2017 AQ/GHG Report, the project's 2017 Draft Traffic Impact Analysis (TIA) (IBI 2017) has been revised due to comments received from the California Department of Transportation (Caltrans) during the public comment period of the Draft Environmental Impact Report (EIR). The 2017 TIA evaluated the proposed project's roadway system assuming the buildout of the Vista Way/State Route (SR) 78 & Interstate (I) 5 Project, which included high-occupancy vehicle (HOV) lanes and ramps. Caltrans noted that the traffic modeling conducted for the 2017 TIA incorrectly assumed that improvements to the interchanges with I-5 would be built and operational in the future traffic scenarios. While this is currently in Caltrans' and the region's long-term plans, funding is not guaranteed with enough certainty to include the improvements in a CEQA-required future analysis scenario. Furthermore, Caltrans requested that additional intersections be included in the 2017 TIA's analysis.

In August 2018, IBI finalized a revised TIA (IBI 2018) for the proposed project in response to the Caltrans comments. The revised TIA added the analysis of the proposed project's roadway system without the buildout of the Vista Way/SR-78 & I-5 Interchange Project (i.e., it excludes HOV lanes and ramps). The revised TIA also includes the evaluation of additional intersections that were not analyzed in the 2017 TIA.

To consider the implications of these revisions and refinements to the TIA, this technical memorandum has been prepared to supplement the air quality and GHG analysis of the 2017 AQ/GHG Report.

Comparison of the Revised TIA to the 2017 TIA

As previously stated, the revised TIA remodeled the traffic scenarios per Caltrans comments to include the analysis of the proposed project's roadway system without the buildout of the Vista Way/SR-78 & I-5 Interchange Project and nine new intersections in addition to the 47 intersections evaluated in the 2017 TIA. The nine new intersections included in the revised TIA are:

48. Harbor/Vandergrift Boulevard & San Rafael Drive/I-5 Northbound (NB) On-Ramp

49. SR 76 & I-5 Southbound (SB) On-Ramp

50. SR 76 & I-5 NB On-/Off-Ramp

51. Mission Avenue & Pirates Cove Way/I-5 SB Off-Ramp

52. Oceanside Boulevard & I-5 SB On-/Off-Ramp

53. Oceanside Boulevard & I-5 NB On-/Off-Ramp

54. California Street & Soto Street/I-5 NB On-Ramp

55. Cassidy Street & I-5 SB On-Ramp/I-5 SB Off-Ramp

56. Vista Way & I-5 SB On-/Off-Ramp

In addition, ESA air quality and GHG specialists reviewed the revised TIA to determine whether any changes were made to the intersections evaluated in the 2017 TIA, which could substantially change the findings of the 2017 AQ/GHG Report. At the time the 2017 AQ/GHG Report was conducted, detailed construction activities and operational information in relation to the Incentive District were not available to quantify criteria pollutant and GHG emissions. The revisions made to 2017 TIA do not change the availability of this information. Therefore, this technical memorandum does not reevaluate the construction or operational impacts associated with implementation of the Incentive District. Furthermore, the revised TIA does not include additional construction activities to those evaluated in the 2017 AQ/GHG Report and, as such, no further construction analyses estimating air quality or GHG emissions are required to be conducted in this technical memorandum. Finally, the revised TIA does not change the findings of the 2017 AQ/GHG Report in regard to the applicability of current air quality plans, policies, or regulation adopted for the purpose of reducing the emissions of GHGs because the construction and operation of the project would still be required to adhere to these plans, policies, and regulations.

However, based on the review of the revised TIA, ESA air quality and GHG specialists identified two substantial changes from the 2017 TIA: (1) changes to the total peak hour traffic volumes at the intersections analyzed for the carbon monoxide (CO) hotspots analysis, and (2) changed information related to vehicle miles traveled (VMT) for the proposed project. These two issues have been re-analyzed in this technical memorandum based on the new information provided in the revised TIA.

Supplemental Analysis Approach

As stated above, the revised TIA resulted in two substantial changes to the traffic data presented in the 2017 TIA, which affects the analysis in the 2017 AQ/GHG Report. The two substantial changes include: (1) changes to the total peak hour traffic volumes at the intersections analyzed for the CO hotspots analysis and (2) changed information related to VMT for the proposed project. Therefore, this supplemental memorandum addresses the potential air quality and GHG impacts generated by the change in traffic volumes at the original intersections in addition to the nine new intersections as well as the changes to the VMT. This supplemental air quality and GHG analysis will determine whether any of the changed/new intersections result in exceedance of thresholds, and whether they result in a significant impact, when considered both alone and with all other cumulative projects. The significance thresholds used in this supplemental memorandum will be the same as those used in the 2017 AQ/GHG Report.

Supplemental Air Quality and GHG Analysis

This technical memorandum is consistent with the format and numbering system of the 2017 AQ/GHG Report, and only supplements and revises the applicable portions of the associated sections, shown below, of the 2017 AQ/GHG Report based on the revised TIA. The following analysis conclusions supersede the 2017 AQ/GHG Report's conclusions.

4.3 Project Impacts

Issue 2: Would the proposed project violate any air quality standard or contribute substantially to an existing or projected air quality violation?

To assess the changes in VMT with implementation of the proposed project, the 2017 TIA compared VMT for the 2008 model year and Future 2035 without Project traffic scenario with the Future 2035 with Project traffic scenario. The 2017 TIA estimated 6.56 VMT per capita for the 2008 model base year and 7.11 VMT per capita under the Future 2035 without Project traffic scenario (IBI 2017). The 2017 TIA also estimated 6.36 VMT for the Future 2035 with Project traffic scenario, which represents a reduction of 3 percent and 11 percent, respectively (IBI 2017). Therefore, the 2017 TIA concluded that implementation of the proposed project would result in increased transportation efficiency on a per capita basis relative to the 2008 model base year and Future 2035 without Project conditions and would reduce per capita mobile source emissions. This reduction in per capita VMT is supportive of per capita VMT reduction efforts in the San Diego Association of Governments (SANDAG) 2050 Regional Transportation Plan/Sustainable Communities Strategy (2050 RTP/SCS).

Based on the new traffic modeling required for the revised TIA, the estimated VMT for the proposed project has changed. The revised TIA estimated 6.33 VMT per capita for the Future 2035 with Project, which is a 0.03 reduction from the VMT per capita estimated for the proposed project in the 2017 TIA. The revised TIA concluded that implementation of the proposed project would further reduce VMT per capita compared to the 2008 model base year (6.56 VMT per capita) and the Future 2035 without Project (7.11 VMT per capita) than what was previously included in the 2017 TIA (IBI 2018). Thus, VMT per capita would be reduced with the project compared to the 2008 model base year and the Future 2035 without Project traffic scenario by approximately 4 percent and 11 percent, respectively. Therefore, the proposed project would result in increased transportation efficiency on a per capita basis relative to the 2008 model base year and Future 2035 without

Project traffic scenario and would reduce per capita mobile source emissions. This reduction in per capita VMT is supportive of per capita VMT reduction efforts in the SANDAG 2050 RTP/SCS.

While VMT is estimated to be reduced with implementation of the proposed project, since detailed information regarding individual development projects within the Incentive District is not currently available, it cannot be determined with certainty that MM Incentive District AIR-2 would reduce impacts to a less than significant level. Additional feasible measures beyond the mitigation provided by MM Incentive District AIR-2 cannot be developed without knowing the exact nature of the proposed developments, including but not limited to the types and sizes of the proposed uses and associated trip generation rates. For these reasons, the operation of projects developed under the Incentive District would result in a potentially significant impact. As such, as determined in the 2017 AQ/GHG Report, the impact would remain ***significant and unavoidable***.

Issue 3: Would the proposed project expose sensitive receptors to substantial pollutant concentrations?

CO Hotspots

As stated in the 2017 AQ/GHG Report, a project would expose sensitive receptors to substantial pollutant concentrations if it places sensitive receptors near CO hotspots or creates CO hotspots near sensitive receptors. The project would result in a significant impact if the intersection improvements and realignment of trips associated with the Complete Streets improvements result in CO emissions that, when added to the ambient concentrations, would exceed a 1-hour concentration of 20 parts per million (ppm) or an 8-hour average of 9 ppm. As summarized in Section 4.1 of the 2017 AQ/GHG Report, areas where CO 1-hour and or an 8-hour average concentration exceed the above stated standards have been found to occur where signalized intersections operate at or below a level of service (LOS) E (i.e., congested intersections) with peak-hour trips exceeding 3,000 trips. Therefore, as a screening level analysis, a project that would cause an intersection to be degraded below LOS D and would have peak-hour trips greater than 3,000 trips could have a potentially significant impact. If the intersection improvements do not exceed the screening levels, then they would be assumed to not exceed the 1-hour or 8-hour standards. However, if the intersection improvements degrade the LOS below D (change from LOS D or better to E, or LOS E to F) with peak hourly traffic flows of greater than 3,000 vehicles, additional analysis would be required to evaluate the potential significance.

A review of the traffic data for the Future (2035) Conditions with Project in the revised TIA identified eight intersections that would degrade the LOS below LOS D (change from LOS D or better to E, or LOS E to F). These results are shown in Table 8 (revised). While intersection 42 does not degrade in LOS between the Future (2035) with and without Project conditions, the delay time experienced at this intersection substantially increases with Project conditions. Therefore, due to this substantial increase in delay time, intersection 42 was also compared to the CO hotspot screening levels. Although the nine intersections would degrade under the Future (2035) with Project conditions, the intersections would not result in peak hourly flows that exceed 3,000 vehicles during the PM peak hours. Thus, the proposed project would not expose sensitive receptors to substantial concentrations of CO. As such, as determined in the 2017 AQ/GHG Report, impacts related to CO hotspots would remain ***less than significant***.

TABLE 8 (REVISED)
TRAFFIC INTERSECTIONS LEVEL OF SERVICE – FUTURE (2035) + PROJECT

Intersection (Numbering per IBI 2018)	Peak Hour	Future Conditions without Project LOS	Future Conditions + Project LOS	Peak Hourly Flow
4. Coast Highway & Surfrider Way	AM	B	A	1,208
	PM	B	F	2,354
6. Coast Highway & Pier View Way	AM	B	A	796
	PM	A	E	2,049
15. Seagaze Street & Ditmar Street	AM	A	A	503
	PM	D	E	1,358
21. Coast Highway & Wisconsin Avenue	AM	B	A	1,070
	PM	C	F	2,136
26. Oceanside Boulevard & Tremont Street	AM	B	B	573
	PM	F	E	1,035
27. Coast Highway & Oceanside Boulevard	AM	C	B	1,313
	PM	C	F	2,762
29. Coast Highway & Morse Street	AM	B	B	1,272
	PM	C	F	2,447
35. Coast Highway & Cassidy Street	AM	B	A	1,187
	PM	C	F	2,539
42. Vista Way & Ditmar Street	AM	D	D	1,624
	PM	F	F	2,873

SOURCE: IBI 2018.

Appendix C2

Air Quality and GHG Emissions Technical Report (2017)

ESA

Final

City of Oceanside Coast Highway Corridor Study Project

Air Quality and Greenhouse Gas Emissions Technical Report

Prepared for
City of Oceanside

February 2017

ESA

Final

City of Oceanside Coast Highway Corridor Study Project

Air Quality and Greenhouse Gas Emissions Technical Report

Prepared for
City of Oceanside

February 2017

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City of Oceanside Coast Highway Corridor Study Project

Air Quality and Greenhouse Gas Emissions Technical Report

1. Introduction

This technical report addresses the potential impacts to air quality and climate change associated with the proposed Coast Highway Corridor Study Project (proposed project or project). The proposed project is composed of two major components: (1) the Complete Streets improvements and (2) the Coast Highway Incentive District (hereafter referred to as the Incentive District). The project is located primarily along the project segment of the Coast Highway Corridor and extends into the adjacent neighborhoods, all within the City of Oceanside, California. The project corridor consists of a variety of land uses, including primarily commercial and retail along Coast Highway, with surrounding residential, primarily one block (east and west) off of the Coast Highway corridor. It should be noted that when referring specifically to each project component, the terms "Complete Streets improvements" and "Incentive District" will be used to describe the individual areas, while the term "project area" will be used when referring to the combined area of both project components.

This analysis describes the existing air quality in the project area, identifies applicable rules and regulations, and evaluates potential short- and long-term air quality impacts associated with implementation of the project. Specifically, this technical report provides a quantitative analysis of potential air quality impacts associated with the Complete Streets improvements, and a programmatic analysis of the air quality impacts associated with future development that may fall under the Incentive District.

Additionally, this analysis provides background information on greenhouse gas (GHG) emissions and evaluates potential impacts associated with the project's GHG contributions. Furthermore, where applicable, measures to mitigate or minimize air pollutants and GHG emissions associated with the project are included. Similar to the air quality analyses, this technical report provides quantitative and programmatic analyses of potential GHG impacts associated with the Complete Streets improvements and the Incentive District, respectively.

Information used to prepare this analysis was obtained from the City of Oceanside (City) General Plan, the County of San Diego (County) Guidelines for Determining Significance, the San Diego Association of Governments' (SANDAG's) Sustainable Communities Strategy (SCS), the project's traffic study prepared by IBI Group (January 2017), and other sources identified herein.

This technical report is being prepared to support the environmental review process for the project under the California Environmental Quality Act (CEQA). The City is the proponent and the lead agency for the project.

2. Project Description

This section describes the project components of the Complete Streets improvements and Incentive District. The Complete Streets improvements are specific improvements to be constructed within the existing Coast Highway corridor in the near-term. The creation of the Incentive District would be based on the implementation of the Coast Highway Vision and Strategic Plan, amendments to the Zoning Ordinance for the Incentive District, and an amendment to the City's General Plan.

2.1 Complete Streets Improvements

The Coast Highway corridor currently operates with four travel lanes, two northbound and two southbound, with limited on-street parking and no designated bicycle facilities. The project would result in several changes along the 18.4-acre project corridor of the Coast Highway. The project would convert Coast Highway from four to two lanes throughout the corridor, with segments of two southbound travel lanes between State Route 76 (SR-76) and Surfrider Way, and south of Kelly Street to Eaton Street. The project would provide new roundabout intersections, on-street parking, continuous bicycle facilities, and streetscape improvements within the corridor.

The project would include the phased installation of roundabouts at 12 specific intersections, which are identified in the project Traffic Impact Analysis (TIA) along the Coast Highway corridor and are currently signalized or stop-sign controlled (IBI 2017). The proposed roundabouts would feature one lane in each direction with the exception of the roundabout at SR-76 and Coast Highway, which would consist of two lanes. Roundabouts are proposed along Coast Highway at the intersections with the following streets: SR-76, Surfrider Way, Civic Center Drive, Pier View Way, Michigan Avenue, Washington Avenue, Wisconsin Avenue, West Street, Oceanside Boulevard, Morse Street, Cassidy Street, and Kelly Street. All of these intersections are currently signalized, except for the intersections with Washington Avenue, West Street, and Kelly Street, which currently are stop-sign controlled (IBI 2017). In addition to the installation of roundabouts, the project would also provide ten mid-block crosswalks throughout the corridor to allow for various locations where pedestrians could safely cross Coast Highway.

The project would also add two-way left-turn lanes within the street segments of Coast Highway between Harbor Drive and SR-76 and Pier View Way and Seagaze Drive. Dedicated middle two-way left-turn lane would be added between SR-76 and Surfrider Way, Oceanside Boulevard and Morse Street, and Kelly Street and Vista Way. Street segments with improved raised medians without the ability to turn left would include Surfrider Way to Pier View Way, Seagaze Drive to Oceanside Boulevard, and Morse Street to Kelly Street. Additionally, the project would create continuous bicycle facilities throughout the Coast Highway corridor, starting at Harbor Drive and extending south past Eaton Street.

Construction of the Complete Streets improvements component of the project is anticipated to begin in January 2018 and be completed by December 2035, potentially over approximately an 18-year period. Construction of the project would be implemented in multiple phases, with each phase anticipated to construct a maximum of two roundabouts. The construction of a single roundabout is anticipated to occur over approximately 4 months. For the purpose of this air quality emissions analysis, a worst-case project emissions scenario was assumed consisting of two roundabouts constructed simultaneously over a 4-month period, from January 2018 to April 2018 (one phase). Since each phase is assumed to be identical, one air quality emissions analysis for a single phase is sufficient to represent the worst-case emissions in a day (i.e., pounds per day). Construction activities for a single phase are shown in Table 1. Construction activities are expected to occur from 7:00 a.m. to 6:00 p.m. Monday through Saturday, and no construction is anticipated on Sundays.

TABLE 1
ANTICIPATED PROJECT CONSTRUCTION SCHEDULE (4-MONTH PHASE)

Phases	Number of Workers (Maximum)	Start (month/date/year)	Finish (month/date/year)	Duration (Workdays)
Demolition	35	1/1/2018	1/15/2018	13
Site Prep (Vegetation grubbing/clearing)	25	1/16/2018	1/30/2018	13
Site Grading	30	1/31/2018	2/14/2018	13
Utility Trenching	10	2/15/2018	3/1/2018	13
Facilities Construction	56	3/2/2018	3/30/2018	25
Paving	60	3/31/2018	4/28/2018	25

SOURCE: ESA 2016.

Construction would require demolition and removal of portions of the existing asphalt paved areas. An estimated 3,000 cubic yards of demolished pavement would occur per phase, all of which would require export off-site. Hauling of demolition debris (pavement removed for roundabouts) for the first phase is expected to occur over approximately 13 days in January 2018. Heavy equipment, including large backhoes, excavators, graders, loaders, rollers, pavers, and haul trucks, would be used in the project area throughout the construction period. It is anticipated that the various construction phases associated with the Complete Streets improvements would, for the most part, occur in sequential order, where one phase would be completed and operational prior to the next phase beginning, as shown in Table 1 above. A maximum of 20 haul truck trips per day were assumed to haul demolition debris (i.e., removed pavement) during the respective phases.

2.2 Incentive District

The Incentive District would extend in an irregular shape from Seagaze Drive to the north past Eaton Street to the south, and extend from Ditmar Street on the east to Pacific Street on the west. The Incentive District would provide optional regulations and standards that a developer or property owner may choose in lieu of the existing underlying zoning. If adopted, the Incentive District would be an optional zoning program that individual developers could choose to apply for new development within the Incentive District boundary. Implementation of the Incentive District would require amendments to the City's existing General Plan and Zoning Ordinance. Since future projects that may fall under the Incentive District are unknown at this time, a programmatic analysis of the Incentive District is presented within this report.

3. Environmental Setting

3.1 Climate and Meteorology

The proposed project is located within the San Diego Air Basin (SDAB), which is under the jurisdiction of the San Diego Air Pollution Control District (SDAPCD). The SDAB is a 4,260-square-mile coastal plain that comprises the entire San Diego region, and is contiguous with the County boundary. The SDAB is geographically bounded by desert and mountain terrain to the north and east, Mexico to the south, and the Pacific Ocean to the west.

The topography in the San Diego region varies greatly, from beaches on the west to mountains and desert on the east, and is defined by mesa tops intersected by canyon areas. The topography in the San Diego region, along with local meteorology, influences the dispersal and movement of pollutants in the basin. The mountains to the east prohibit dispersal of pollutants beyond them and help trap the pollutants in inversion layers.

The weather of the San Diego region is influenced by the Pacific Ocean and its semi-permanent high-pressure systems that result in dry, warm summers, and mild, somewhat wet, cool winters. The regional temperature ranges from lows in the mid-40 degrees Fahrenheit (°F) to highs in the high 90s °F. Most of the County's annual precipitation occurs from November to April, with infrequent (approximately 10 percent) precipitation during the summer. The average seasonal precipitation along the coast is approximately 10 inches, which increases with elevation, as the moist marine air is lifted over the mountains.

Based on recent climate records from the Western Regional Climate Center (WRCC) monitoring station located in the City (Oceanside Marina [ID No. 046377]), the average annual maximum temperature in the region is approximately 67.6 °F and the average annual minimum temperature is approximately 52.9° F.

The interaction of ocean, land, and the predominant Pacific High Pressure Zone maintains clear skies for much of the year and drives the prevailing winds. Local terrain is often the dominant factor inland, and winds in inland mountainous areas tend to blow through the valleys during the day and down the hills and valleys at night.

In conjunction with the two characteristic onshore/offshore wind patterns, there are two types of temperature inversions (i.e., reversals of the normal decrease of temperature with height), which

occur within the region that affect atmospheric dispersive capability and act to degrade local air quality. In the summer, an inversion at approximately 1,100 to 2,500 feet is formed over the entire coastal plain, when the warm air mass over land is undercut by a shallow layer of cool marine air flowing offshore. The prevailing sunny days in the region further exacerbate smog by inducing additional adverse photochemical reactions. During the winter, a nightly, shallow inversion layer (usually at approximately 800 feet) forms between the cooler air at ground level and the warmer air above, which can trap air pollutants. The regional carbon monoxide (CO) concentrations are highest during the winter months.

The predominant onshore/offshore wind pattern is sometimes interrupted by "Santa Ana" conditions, when high-pressure systems over the Nevada-Utah area overcome the prevailing westerly winds, sending strong, steady, hot, and dry winds from the east over the mountains and out toward the Pacific Ocean. Strong Santa Ana winds tend to transport pollutants out over the ocean, producing clear days inland. However, at the onset or breakdown of these conditions, or if the condition is weak, prevailing northwesterly winds strengthen and transport an air mass of contamination from the Los Angeles Basin to the SDAB.

3.2 Federal and State Ambient Air Quality Standards

Ambient Air Quality Standards

Regulation of air pollution is achieved through federal and state ambient air quality standards and emission limits for individual sources of air pollutants. As required by the federal Clean Air Act (CAA), the U.S. Environmental Protection Agency (USEPA) has identified criteria pollutants and has established National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. NAAQS have been established for ozone (O_3), CO, nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb). These pollutants are called "criteria" air pollutants because standards have been established for each of them to meet specific public health and welfare criteria. To protect human health and the environment, USEPA has set "primary" and "secondary" maximum ambient concentration limits for each of the criteria pollutants. Primary standards were set to protect human health, particularly sensitive receptors such as children, the elderly, and individuals suffering from chronic lung conditions like asthma and emphysema. Secondary standards were set to protect the natural environment and prevent damage to animals, crops, vegetation, and buildings.

Regional and Local

The NAAQS establish the concentration level for an air pollutant above which detrimental effects to public health or welfare may result. The NAAQS are defined as the maximum acceptable concentrations that, depending on the pollutant, may not be equaled or exceeded more than once per year or in some cases as a percentile of observations. California has generally adopted more stringent ambient air quality standards than the NAAQS for the criteria air pollutants (i.e., California Ambient Air Quality Standards [CAAQS]) and has adopted CAAQS for some pollutants for which there is no corresponding NAAQS, such as sulfates (SO_4), hydrogen sulfide, vinyl chloride, and visibility-reducing particles. Both NAAQS and CAAQS for criteria air pollutants, along with their associated health effects and sources, are presented in Table 2.

TABLE 2
AMBIENT AIR QUALITY STANDARDS FOR CRITERIA POLLUTANTS

Pollutant	Averaging Time	State Standard	National Standard	Pollutant Health and Atmospheric Effects	Major Pollutant Sources
Ozone (O_3)	1 hour	0.09 ppm	No National Standard	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.	Formed when ROG and NO_X react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial/industrial mobile equipment.
	8 hours	0.07 ppm	0.070 ppm		
Carbon Monoxide (CO)	1 hour	20 ppm	35 ppm	Classified as a chemical asphyxiant, carbon monoxide interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline-powered motor vehicles.
	8 hours	9.0 ppm	9 ppm		
Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm	0.100 ppm	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads.
	Annual Arithmetic Mean	0.030 ppm	0.053 ppm		
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm	75 ppb	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
	3 hours	No State Standard	0.50 ppm		
	24 hours	0.04 ppm	0.14 ppm		
	Annual Arithmetic Mean	No State Standard	0.03 ppm		
Respirable Particulate Matter (PM10)	24 hours	50 µg/m^3	150 µg/m^3	May irritate eyes and respiratory tract, decreases in lung capacity, cancer and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	Annual Arithmetic Mean	20 µg/m^3	No National Standard		
Fine Particulate Matter (PM2.5)	24 hours	No State Standard	35 µg/m^3	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning; Also, formed from photochemical reactions of other pollutants, including NO_X, sulfur oxides, and organics.
	Annual Arithmetic Mean	12 µg/m^3	12 µg/m^3		
Lead (Pb)	30 Day Average	1.5 µg/m^3	No National Standard	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction (in severe cases).	Present source: lead smelters, battery manufacturing and recycling facilities. Past source: combustion of leaded gasoline.
	Calendar Quarter	No State Standard	1.5 µg/m^3		
	Rolling 3-Month Average	No State Standard	0.15 µg/m^3		
Hydrogen Sulfide	1 hour	0.03 ppm	No National Standard	Nuisance odor (rotten egg smell), headache and breathing difficulties (higher concentrations)	Geothermal power plants, petroleum production and refining
Sulfates (SO_4)	24 hour	25 µg/m^3	No National Standard	Decrease in ventilatory functions; aggravation of asthmatic symptoms; aggravation of cardio-pulmonary disease; vegetation damage; degradation of visibility; property damage.	Industrial processes.
Visibility Reducing Particles	8 hour	Extinction of 0.23/km; visibility of 10 miles or more	No National Standard	Reduces visibility, reduced airport safety, lower real estate value, and discourages tourism.	See $PM_{2.5}$.

NOTE: ppm = parts per million; ppb = parts per billion; µg/m^3 = micrograms per cubic meter.

SOURCE: CARB 2016.

Criteria Air Pollutants

The California Air Resources Board (CARB) and USEPA currently focus on criteria air pollutants because they are the most prevalent air pollutants known to be injurious to human health, and extensive health-effects criteria documents are available about their effects on human health and welfare. A general description of these pollutants is provided below.

Ozone

O_3, the main component of photochemical smog, is primarily a summer and fall air pollution problem. O_3 is not emitted directly into the air, but is formed through a complex series of chemical reactions involving other compounds that are directly emitted, known as ozone precursors, which include reactive organic gases (ROGs), also known as volatile organic compounds (VOCs), and oxides of nitrogen (NO_X).

Carbon Monoxide

CO, a colorless and odorless gas, is a relatively non-reactive pollutant that is a product of incomplete combustion, mostly associated with motor vehicles. When inhaled at high concentrations, CO combines with hemoglobin in the blood and reduces the oxygen-carrying capacity of the blood. This results in reduced oxygen reaching the brain, heart and other body tissues. This condition is especially critical for people with cardiovascular diseases, chronic lung disease, or anemia. CO measurements and modeling were important in the early 1980s, when CO levels were regularly exceeded throughout California. In more recent years, CO measurements and modeling have not been a priority in most California air districts due to the retirement of older polluting vehicles, lower CO emissions from new vehicles, and improvements in fuels.

Nitrogen Dioxide

NO_2 is a reddish-brown gas that is a by-product of the combustion processes. Motor vehicles and industrial operations are the main sources of NO_2. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2. The combined emissions of NO and NO_2 are referred to as NO_X, which are reported as equivalent NO_2. Aside from its contribution to ozone formation, NO_2 can increase the risk of acute and chronic respiratory disease and reduce visibility. NO_2 may be visible as a coloring component of brown clouds on high-pollution days, especially in conjunction with high O_3 levels.

Sulfur Dioxide

SO_2 is a colorless, extremely irritating gas or liquid that enters the atmosphere as a pollutant, mainly as a result of burning high sulfur-content fuel oils and coal, and from chemical processes occurring at chemical plants and refineries. When SO_2 oxidizes in the atmosphere, it forms sulfur trioxide (SO_3). Collectively, these pollutants are referred to as sulfur oxides (SO_X).

Particulate Matter

PM_{10} and $PM_{2.5}$ consist of particulate matter (PM) that is 10 microns[1] or less in diameter and 2.5 microns or less in diameter, respectively. PM_{10} and $PM_{2.5}$ represent fractions of PM that can be inhaled into the air passages and the lungs and can cause adverse health effects. Acute and chronic health effects associated with high PM levels include the aggravation of chronic respiratory diseases, heart and lung disease, coughing, bronchitis and respiratory illnesses in children. Recent mortality studies have shown an association between morbidity and mortality and daily concentrations of PM in the air. PM can also damage materials and reduce visibility. One common source of $PM_{2.5}$ is diesel exhaust emissions.

PM_{10} and $PM_{2.5}$ consist of PM emitted directly into the air (e.g., fugitive dust, soot, and smoke from mobile and stationary sources, construction operations, fires, and natural wind-blown dust), and PM formed in the atmosphere by condensation and/or transformation of SO_2 and ROG. Traffic generates PM emissions through entrainment of dust and dirt particles that settle onto roadways and parking lots. PM_{10} and $PM_{2.5}$ are also emitted by the burning of wood in residential wood stoves and fireplaces, and open agricultural burning. $PM_{2.5}$ can also be formed through secondary processes, such as airborne reactions with certain pollutant precursors, including ROGs, ammonia (NH_3), NO_X, and SO_X.

Lead

Pb is a metal found naturally in the environment and present in some manufactured products. The proposed project does not generate Pb emissions, thus Pb is not discussed further in this analysis.

Toxic Air Contaminants

Concentrations of toxic air contaminants (TACs), or in federal parlance hazardous air pollutants (HAPs), are also used as indicators of ambient air quality conditions. A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air mass; however, their high toxicity and/or health risk may pose a threat to public health even at low concentrations.

According to the California Almanac of Emissions and Air Quality (CARB 2009), the majority of the estimated health risk from TACs can be attributed to relatively few compounds, the most important being PM from diesel-fueled engines (diesel PM). Diesel PM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled internal combustion engines, the composition of diesel PM emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present.

[1] A micron is one-millionth of a meter.

Odorous Emissions

Odors are generally regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache). Offensive odors are unpleasant and can lead to public distress generating citizen complaints to local governments. Although unpleasant, offensive odors rarely cause physical harm. The occurrence and severity of odor impacts depend on the nature, frequency, and intensity of the source, wind speed, direction, and the sensitivity of receptors.

3.3 Project Area Air Quality

Ambient air quality in San Diego County is measured through a system of monitoring stations established at various locations throughout the County, operated by the SDAPCD. The station nearest to the City is the Camp Pendleton Station located at 21441 West B Street on Marine Corps Base Camp Pendleton, approximately 0.5 miles north of the project area, within the coastal zone, and considered the most representative of the City's ambient air quality for the criteria pollutants. The latest available annual air quality data for these stations, 2013 through 2015, are provided in Table 3.

CO, SO_2, and PM_{10} are not measured at the Camp Pendleton Station, or any other monitoring station within the project area that is representative of the project area's air quality conditions. Therefore, the measurements from these pollutants are not included in Table 3.

Both the CARB and USEPA use this type of monitoring data to designate areas according to their attainment status for criteria air pollutants. The purpose of these designations is to identify the areas with air quality problems and thereby initiate planning efforts for improvement. The three basic attainment designation categories are nonattainment, attainment, and unclassified. Unclassified is designated for an area that cannot be classified on the basis of available information as meeting or not meeting the standards. In addition, the California attainment designations include a subcategory of nonattainment-transitional, which is given to nonattainment areas that are progressing and nearing attainment. The current attainment status for the SDAB is provided in Table 4.

TABLE 3
AIR QUALITY DATA SUMMARY (2013-2015) FOR PROJECT AREA

Pollutant	Standard[a]	Monitoring Data by Year 2013	2014	2015
Ozone				
Highest 1 Hour Average (ppm)		0.08	**0.100**	**0.09**
Days over State Standard	0.09 ppm	0	1	1
Highest 8 Hour Average (ppm)		0.07	**0.08**	**0.08**
Days over National Standard	0.075 ppm	0	1	1
Days over State Standard	0.070 ppm	0	5	3
Carbon Monoxide [d]				
Highest 8 Hour Average (ppm)		*	*	*
Days over National Standard	9.0 ppm	*	*	*
Days over State Standard	9.0 ppm	*	*	*
Nitrogen Dioxide				
Highest 1 Hour Average (ppm)		0.081	0.060	0.060
Days over National Standard	0.100 ppm	0	0	0
Days over State Standard	0.18 ppm	0	0	0
Annual Average (ppm)		*	0.007	0.007
Days over National Standard	0.053 ppm	0	0	0
Days over State Standard	0.030 ppm	0	0	0
Sulfur Dioxide [d]				
Highest 24 Hour Average (ppm)		*	*	*
Days over State Standard	0.04 ppm	*	*	*
Particulate Matter (PM_{10}) [d]				
Highest 24 Hour Average ($\mu g/m^3$)[b]		*	*	*
Days over National Standard (measured)[c]	150 $\mu g/m^3$	*	*	*
Days over State Standard (measured)[c]	50 $\mu g/m^3$	*	*	*
Annual Average ($\mu g/m^3$)[b]	20 $\mu g/m^3$	*	*	*
Particulate Matter ($PM_{2.5}$) –				
Highest 24 Hour Average ($\mu g/m^3$)[b]		42.3	28.0	41.2
Days over National Standard (measured)[c]	35 $\mu g/m^3$	1	0	*
Annual Average ($\mu g/m^3$)[b]	12 $\mu g/m^3$	8.5	*	*

ppm = parts per million; $\mu g/m^3$ = micrograms per cubic meter.

* = Insufficient data available to determine the value.

[a] Generally, state standards and national standards are not to be exceeded more than once per year.

[b] Concentrations and averages represent federal statistics. State and federal statistics may differ because of different sampling methods.

[c] Measurements are usually collected every six days. Days over the standard represent the measured number of days that the standard has been exceeded.

[d] Pollutant not monitored at air monitoring site representative of project area.

SOURCE: SDAPCD 2016a.

TABLE 4
SAN DIEGO AIR BASIN ATTAINMENT STATUS

	Attainment Status	
Pollutant	**California Standards**	**Federal Standards**
O_3 – 1 hour	Non-attainment	No Federal Standard
O_3 –8 hours	Non-attainment	Non-attainment
CO	Attainment	Unclassified/Attainment
NO_2	Attainment	Unclassified/Attainment
SO_2	Attainment	Attainment
PM_{10}	Non-attainment	Unclassified
$PM_{2.5}$	Non-attainment	Unclassified/Attainment
Pb	Unclassified/Attainment	Unclassified/Attainment

SOURCE: SDAPCD 2016b.

3.4 Sensitive Receptors

Air-quality-sensitive receptors are individuals who are considered more sensitive to air pollutants than others. The reasons for greater-than-average sensitivity may include pre-existing health problems, proximity to emissions sources, or duration of exposure to air pollutants. Schools, hospitals, and convalescent homes are considered to be relatively sensitive to poor air quality because children, elderly people, and the infirm are more susceptible to respiratory distress and other air-quality-related health problems than the general public. Residential areas are considered sensitive to poor air quality because, in general, people are at their residences for extended periods of time, with greater exposure time to poor ambient air quality. Recreational uses are also considered sensitive due to the greater exposure to poor ambient air quality conditions because vigorous exercise associated with recreation places a high demand on the human respiratory system, resulting in inhaling more pollutants and aggravating respiratory conditions.

Currently, sensitive receptors located in the project area include Oceanside High School, Saint Mary Star of the Sea Elementary and Middle School, Santa Margarita Elementary School, South Oceanside Elementary School, and Naval Hospital Camp Pendleton, all of which are within 0.5 miles from the project area. The nearest sensitive receptors include various single-family and multi-family residential homes adjacent to the 3.5-mile Coast Highway corridor.

3.5 Background on Greenhouse Gases and Climate Change

This section provides background setting information specific to GHG emissions and their effect on global climate change. GHGs are those compounds in the Earth's atmosphere which play a critical role in determining temperature near the Earth's surface. Specifically, these gases allow high-frequency shortwave solar radiation to enter the Earth's atmosphere, but retain some of the low-frequency infrared energy that is radiated back from the Earth toward space, resulting in a warming of the atmosphere. This phenomenon is known as the greenhouse effect.

The major concern with GHGs is increasing GHG concentrations in the atmosphere and the correlation with global climate change. Increased concentrations of GHGs in the Earth's atmosphere, attributed by the Intergovernmental Panel on Climate Change (IPCC) to anthropogenic activities (IPCC 2014), have been linked to global climate change and subsequent conditions such as rising surface temperatures, melting icebergs and snowpack, rising sea levels, and the increased frequency and magnitude of severe weather conditions. Existing climate change models also show that climate warming portends a variety of impacts on agriculture, including loss of microclimates that support specific crops, increased pressure from invasive weeds and diseases, and loss of productivity due to changes in water reliability and availability. In addition, rising temperatures and shifts in microclimates associated with global climate change are expected to increase the frequency and intensity of wildfires. Although there is disagreement as to the rate of global climate change and the extent of the impacts attributable to human activities, most in the scientific community agree that there is a direct link between increased emissions of GHGs and long-term global temperature increases.

The GHGs regulated under state law are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). Because different GHGs have different warming potential, and CO_2 is the most common reference GHG for climate change, GHG emissions are often quantified and reported as CO_2 equivalents (CO_2e). Large emission sources are reported in million metric tons (MMT) of CO_2e.[2]

Some of the potential effects of global warming specifically in California may include loss in snow pack, sea-level rise, more days of extreme heat per year, more days of high O_3 levels due to increased temperatures, more drought years, and more forest fires (CARB, 2009). Globally, climate change has the potential to impact numerous environmental resources through potential, though uncertain, impacts related to future air temperatures and precipitation patterns.

3.6 Air Quality and GHG Regulatory Setting

Federal

The principal air quality regulatory mechanism at the federal level is the CAA, and in particular, the 1990 amendments to the CAA and the NAAQS that it establishes. The NAAQS identify the maximum ambient (background) concentration levels of criteria pollutants that are considered to be safe, with an adequate margin of safety, to protect public health and welfare. As discussed previously, the criteria pollutants include O_3, CO, NO_2 (which is a form of NO_X), SO_2 (which is a form of SO_X), PM_{10}, $PM_{2.5}$, and Pb.

The CAA also requires each state to prepare an air quality control plan, referred to as a state implementation plan (SIP). The CAA Amendments of 1990 (CAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins, as reported by their jurisdictional

[2] A metric ton is 1,000 kilograms; it is equal to approximately 1.1 U.S. tons and approximately 2,204.6 pounds.

agencies. USEPA is responsible for reviewing all SIPs to determine whether they conform to the mandates of the CAA and its amendments, and to determine whether implementing the SIPs will achieve air quality goals. USEPA's primary role at the state level is to oversee the state air quality programs. USEPA sets federal vehicle and stationary source emissions standards and provides research and guidance in air pollution programs.

The federal CAA does not specifically regulate GHG emissions; however, the U.S. Supreme Court has determined that GHGs are pollutants that can be regulated under the federal CAA. On December 7, 2009, the USEPA Administrator signed two distinct findings regarding GHGs under Section 202(a) of the federal Clean Air Act. The USEPA adopted a Final Endangerment Finding for the six defined GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6). The Endangerment Finding is required before USEPA can regulate GHG emissions under Section 202(a)(1) of the Clean Air Act consistent with the United States Supreme Court decision. The USEPA also adopted a Cause or Contribute Finding in which the USEPA Administrator found that GHG emissions from new motor vehicle and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. There are currently no federal regulations that set ambient air quality standards for GHGs. However, in August 2012, the USEPA adopted vehicle emissions standards for GHGs for model year 2017 through 2025 passenger cars and light-duty trucks. By 2025, vehicles are required to achieve 54.5 mpg (if GHG reductions are achieved exclusively through fuel economy improvements) and 163 grams of CO_2 per mile.

State

California Air Resources Board

CARB, a department of the California Environmental Protection Agency (Cal/EPA), oversees air quality planning and control throughout California by administering the SIP. Its primary responsibility lies in ensuring implementation of the 1989 Amendments to the California Clean Air Act (CCAA), responding to the federal CAA requirements, and regulating emissions from motor vehicles sold in California. CARB also sets fuel specifications to further reduce vehicular emissions.

The CCAA established CAAQS, and a legal mandate to achieve these standards by the earliest practical date. CAAQS apply to the same criteria pollutants as the federal CAA, and also include sulfates, visibility reducing particulates, hydrogen sulfide and vinyl chloride. CAAQS are also generally more stringent than the NAAQS.

CARB is also responsible for regulations pertaining to TACs. The Air Toxics "Hot Spots" Information and Assessment Act was enacted in 1987 as a means to establish a formal air toxics emission inventory risk quantification program. Assembly Bill (AB) 2588, as amended, establishes a process that requires stationary sources to report the type and quantities of certain substances their facilities routinely release.

In 2004, CARB adopted an Airborne Toxic Control Measure (ATCM) to limit heavy-duty diesel motor vehicle idling in order to reduce public exposure to diesel PM and other TACs (Title 13 California Code of Regulations [CCR], Section 2485). The measure applies to diesel-fueled

commercial vehicles with gross vehicle weight ratings greater than 10,000 pounds that are licensed to operate on highways, regardless of where they are registered. This measure does not allow diesel-fueled commercial vehicles to idle for more than 5 minutes at any given time.

In 2008, CARB also approved the Truck and Bus regulation to reduce PM and NO_X emissions from existing diesel vehicles operating in California (13 CCR, Section 2025, subsection (h)). The requirements were amended to apply to nearly all diesel-fueled trucks and buses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. This regulation is phased over 8 years, starting in 2015 and would be fully implemented by 2023, meaning that all trucks operating in the State subject to this option would meet or exceed the 2010 engine emission standards for NO_X and PM by 2023.

In addition to limiting exhaust from idling trucks, CARB also promulgated emission standards for off-road diesel construction equipment of greater than 25 horsepower (hp) such as bulldozers, loaders, backhoes and forklifts, as well as many other self-propelled off-road diesel vehicles. The regulation adopted by CARB on July 26, 2007 aims to reduce emissions by installation of diesel soot filters and encouraging the retirement, replacement, or repower of older, dirtier engines with newer emission controlled models (13 CCR, Section 2449). Implementation is staggered based on fleet size (which is the total of all off-road horsepower under common ownership or control), with large fleets beginning compliance in 2014, medium fleets in 2017, and small fleets in 2019. Full compliance is required by 2023 in all equipment for large and medium fleets and by 2028 for small fleets.

Executive Order S-3-05

In 2005, in recognition of California's vulnerability to the effects of climate change, then Governor Arnold A. Schwarzenegger established Executive Order S-3-05, which set forth a series of target dates by which statewide emissions of GHGs would be progressively reduced, as follows:

- By 2010, reduce GHG emissions to 2000 levels
- By 2020, reduce GHG emissions to 1990 levels
- By 2050, reduce GHG emissions to 80 percent below 1990 levels

Executive Order S-1-07

Executive Order S-1-07, which was signed by Governor Schwarzenegger in 2007, proclaims that the transportation sector is the main source of GHG emissions in California. It establishes a goal to reduce the carbon intensity of transportation fuels sold in California by at least 10 percent by 2020. As a result of this order, CARB approved a proposed regulation to implement the low-carbon fuel standard on April 23, 2009, which will reduce GHG emissions from the transportation sector in California by about 16 MMT in 2020.

Executive Order B-30-15

California Governor Edmund G. Brown issued on April 29, 2015, through Executive Order B-30-15, the following GHG emission reduction target:

- By 2030, California shall reduce GHG emissions to 40 percent below 1990 levels.

California Global Warming Solutions Act

California AB 32, codified under Health and Safety Code (HSC) Division 25.5 and referred to as the California Global Warming Solutions Act of 2006, requires CARB to establish a statewide GHG emissions cap for 2020 based on 1990 emission levels. AB 32 required CARB to adopt and enforce programs and regulations that identify and require selected sectors or categories of emitters of GHGs to report and verify their statewide GHG emissions. In December 2007, CARB adopted 427 MT CO_2e as the statewide GHG emissions limit equivalent to the statewide levels for 1990. This is approximately 28 percent below forecasted 2020 "business-as-usual" (BAU) emissions of 596 MMT of CO_2e, and about 10 percent below average annual GHG emissions during the period of 2002 through 2004 (CARB 2009b). In 2016, the California State Legislature adopted Senate Bill (SB) 32 and its companion bill AB 197, and both were signed by Governor Brown. SB 32 and AB 197 amends HSC Division 25.5 and establishes a new climate pollution reduction target of 40 percent below 1990 levels by 2030 and includes provisions to ensure the benefits of state climate policies reach into disadvantaged communities.

Climate Change Scoping Plan

In December 2008, CARB approved the AB 32 Scoping Plan outlining the state's strategy to achieve the 2020 GHG emissions limit (CARB 2009b). This Scoping Plan, developed by CARB in coordination with the Climate Action Team, proposes a comprehensive set of actions designed to reduce overall GHG emissions in California, improve the environment, reduce dependence on oil, diversify California's energy sources, save energy, create new jobs, and enhance public health.

The first update to the AB 32 Scoping Plan was approved on May 22, 2014, by CARB. As part of the proposed update to the Scoping Plan, the emissions reductions required to meet the 2020 statewide GHG emissions limit were further adjusted. CARB recalculated the Scoping Plan's 1990 GHG emissions level, which resulted in 431 MMT of CO_2e, the 2020 GHG emissions limit established in response to AB 32 is now slightly higher than the 427 MMT of CO_2e in the initial Scoping Plan. Considering that the proposed update also adjusted the 2020 BAU forecast of GHG emissions to 509 MMT of CO_2e, a 15 percent reduction below the estimated BAU levels was determined to be necessary to return to 1990 levels by 2020 (CARB 2014). With the passage of SB 32, CARB is in the process of preparing the second update to the Scoping Plan to reflect the 2030 target established in Executive Order B-30-15 and SB 32.

Senate Bill 375

Senate Bill (SB) 375, which establishes mechanisms for the development of regional targets for reducing passenger vehicle GHG emissions, was adopted by the State on September 30, 2008. On September 23, 2010, CARB adopted the vehicular GHG emissions reduction targets that had been

developed in consultation with the metropolitan planning organizations (MPOs). The targets require a 7 to 8 percent reduction by 2020 and between 13 to 16 percent reduction by 2035 for each MPO. The San Diego Association of Governments (SANDAG) 2050 Regional Transportation Plan (RTP) and its Sustainable Communities Strategy (SCS) reduction target for per capita vehicular emissions is 7 percent by 2020 and 13 percent by 2035 (SANDAG 2011).

Senate Bill 97

SB 97, enacted in August 2007, required the Office of Planning and Research (OPR) to develop guidelines for the mitigation of GHG emissions, or the effects related to releases of GHG emissions. On April 13, 2009, the OPR submitted proposed amendments to the Natural Resources Agency in accordance with SB 97 regarding analysis and mitigation of GHG emissions. As directed by SB 97, the Natural Resources Agency adopted amendments to the CEQA Guidelines for GHG emissions on December 30, 2009. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.

Title 24, Building Standards Code and CALGreen Code

The California Energy Commission first adopted the Energy Efficiency Standards for Residential and Nonresidential Buildings (California Code of Regulations, Title 24, Part 6) in 1978 in response to a legislative mandate to reduce energy consumption in the state. Although not originally intended to reduce GHG emissions, increased energy efficiency, and reduced consumption of electricity, natural gas, and other fuels would result in fewer GHG emissions from residential and nonresidential buildings subject to the standard. The standards are updated periodically to allow for the consideration and inclusion of new energy efficiency technologies and methods.

Part 11 of the Title 24 Building Energy Efficiency Standards is referred to as the California Green Building Standards (CALGreen) Code. The purpose of the CALGreen Code is to "improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a positive environmental impact and encouraging sustainable construction practices in the following categories: (1) Planning and design; (2) Energy efficiency; (3) Water efficiency and conservation; (4) Material conservation and resource efficiency; and (5) Environmental air quality." The CALGreen Code is not intended to substitute for or be identified as meeting the certification requirements of any green building program that is not established and adopted by the California Building Standards Commission. When the CALGreen Code went into effect in 2009, compliance through 2010 was voluntary. As of January 1, 2011, the CALGreen Code is mandatory for all new buildings constructed in the state. The CALGreen Code establishes mandatory measures for new residential and non-residential buildings. Such mandatory measures include energy efficiency, water conservation, material conservation, planning and design and overall environmental quality. The CALGreen Code was most recently updated in 2016 to include new mandatory measures for residential as well as nonresidential uses; the new measures took effect on January 1, 2017.

Renewables Portfolio Standard

On April 12, 2011, Governor Jerry Brown signed SB X1-2 to increase California's Renewables Portfolio Standard to 33 percent by 2020. SB 350 (Chapter 547, Statues of 2015) further increased the Renewables Portfolio Standard to 50 percent by 2030. The legislation also included interim targets of 40 percent by 2024 and 45 percent by 2027. SB 350 was signed into law on October 7, 2015.

Regional

Sustainable Communities Strategies

SANDAG adopted the 2015 SCS in October 2015, which builds on the previous 2011 SCS and directs investments within existing urbanized areas to encourage growth within existing higher-density urban boundaries and discourage urban and suburban sprawl. Elements of the 2011 SCS that have been implemented include the completion of bicycle and pedestrian projects and the expansion of transit with new rapid bus service. The goals of the 2015 SCS include increasing the number of homes and jobs near transit, reducing transit travel time, and achieving economic benefits due to reduced congestion and the construction of transportation infrastructure, as well as reducing air pollutant emissions.

San Diego Air Pollution Control District

SDAPCD is the agency responsible for protecting the public health and welfare in the SDAB (i.e., the County) through the administration of federal and state air quality laws and policies. Included in SDAPCD's tasks are the monitoring of air pollution, the preparation of the County's portion of the SIP, and the promulgation of rules and regulations. The SIP includes strategies and tactics to be used to attain and maintain acceptable air quality in the SDAB (i.e., the County); this list of strategies is called the San Diego Regional Air Quality Strategy (RAQS) (SDAPCD 2009). The rules and regulations include procedures and requirements to control the emission of pollutants and prevent significant adverse impacts.

The following SDAPCD rules and regulations apply to new construction:

- Regulation IV: Prohibitions; Rule 51: Nuisance. Prohibits the discharge, from any source, of such quantities of air contaminants or other materials that cause or have a tendency to cause injury, detriment, nuisance, annoyance to people and/or the public, or damage to any business or property.
- Regulation IV: Prohibitions; Rule 55: Fugitive Dust. Regulates fugitive dust emissions from any commercial construction or demolition activity capable of generating fugitive dust emissions, including active operations, open storage piles, and inactive disturbed areas, as well as track-out and carry-out onto paved roads beyond a project site.
- Regulation IV: Prohibitions; Rule 67.0: Architectural Coatings. Requires manufacturers, distributors, and end users of architectural and industrial maintenance coatings to reduce VOCs emissions from the use of these coatings, primarily by placing limits on the VOC content of various coating categories.

- Regulation XII: Prohibitions, Rule 1200: Toxic Air Contaminants –Requires stationary sources to be equipment with application Toxic Best Available Control Technology (BACT) if the maximum incremental Cancer Risk is found to be greater than one in one million. With implementation of applicable BACT's, SDAPCD allows an incremental Cancer Risk less than ten in one million. According to SDAPCD's *New Source review Requirements for Best Available Control Technology (BACT) Guidance Document (SDAPCD, 2011)*, the following applicable BACTs would apply to the project in respect to off-road construction equipment:
  - California use Clean Diesel fuel and Turbocharger, Low Temperature Aftercooler, and Retardation of Fuel Injection Timing 4 Degrees from manufacturer's specification, USEPA or CARB certified engine and PCV filter.

The RAQS contains six Transportation Control Measures that are consistent with program commitments made in the 2007 Regional Transportation Plan (RTP) and the 2006 Regional Transportation Improvement Program (RTIP) adopted and implemented by SANDAG. The six RAQS Transportation Control Measures relate to: (1) Transit Improvements; (2) Vanpools; (3) High-Occupancy Vehicle (HOV) Lanes; (4) Park-and-Ride Facilities; (5) Bicycle Facilities; and (6) Traffic Signal Improvements. SDAPCD's Indirect Source Program, adopted by the District Board in December 1997, consists of ongoing outreach and assistance to local governments, land developers, and neighborhood groups to reduce vehicle trips and associated emissions through voluntary land use and street design improvements (i.e., "smart growth") (SDAPCD 2009).

SDAPCD provides ongoing technical assistance to SANDAG on programs to encourage smart growth. SDAPCD has also conducted public workshops and other forms of public outreach focused on improving the conditions for pedestrians, bicyclists, and transit.

Oceanside Climate Action Element

In October 2016, the City held two public workshops on the City's General Plan Update, which includes development of a Climate Action Element (E-CAP). The purpose of the E-CAP planning effort is to identify how the City can do its part to achieve State GHG emission reduction goals, provide measures for the City to mitigate its GHG emissions impact, and establish a method to determine whether future actions, such as approval of development projects, are consistent with the GHG emission reduction goals. The E-CAP shall establish goals, objectives, and policies that move the City toward a sustainable future (e.g. improved energy efficiency, expanded renewable energy use, reduced greenhouse gas emissions, and adaptation to the anticipated impacts of climate change). The final E-CAP is anticipated to be released in 2018.

4. Impacts and Mitigation Measures

This section describes the air quality and GHG impact analysis for the proposed project, including the significance criteria, analysis methodologies and thresholds used in the analysis, the assessment of impacts, and any required mitigation measures for impacts that are considered potentially significant. The significance criteria are applicable to both the Complete Streets improvements and Incentive District components of the proposed project.

4.1 Significance Criteria

Consistent with Appendix G of the CEQA Guidelines, the project would result in a significant impact on air quality if it would:

1. Conflict with or obstruct implementation of the applicable air quality plan.
2. Violate any air quality standard or contribute substantially to an existing or projected air quality violation.
3. Expose sensitive receptors to substantial pollutant concentrations.
4. Create objectionable odors affecting a substantial number of people.
5. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).
6. Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.
7. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions.

Air Quality – Criteria Pollutants

As stated in Appendix G of the CEQA Guidelines, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the above determinations. As part of its air quality permitting process, the SDAPCD has established thresholds in Rule 20.2 requiring the preparation of Air Quality Impact Assessments (AQIA) for permitted stationary sources. The SDAPCD sets forth quantitative emission thresholds below which a source would not have a significant impact on ambient air quality. It does not provide PM_{10} and $PM_{2.5}$ thresholds. Because SDAPCD does not provide PM_{10} or $PM_{2.5}$ thresholds, this analysis also considers the San Diego County guidelines, which provide these screening thresholds for these pollutants (County of San Diego 2007). Project-related air quality impacts estimated in this environmental analysis would be considered significant if any of the applicable significance thresholds presented in Table 5 would be exceeded.

CO Hotspots

Areas where CO concentrations exceed the NAAQS and/or CAAQS have been found to occur where signalized intersections operate at or below a level of service (LOS) E (i.e., congested intersections) with peak-hour trips exceeding 3,000 trips. Therefore, as a screening level analysis, a project that would cause an intersection to be degraded to below LOS D and would have peak-hour trips greater than 3,000 trips could have a potentially significant impact. In the screening level analysis determines a potentially significant impact, more detailed technical analyses are typically required, specifically local CO dispersion modeling.

TABLE 5
SCREENING LEVEL THRESHOLDS

Pollutant	Mass Daily Thresholds (lbs/day)	Mass Annual Thresholds (tons/year)
Oxides of Nitrogen (NO_X)	250	40
Reactive Organic Gases (ROG)	75	12.5
Respirable Particulate Matter (PM_{10})	100	15
Fine Particulate Matter ($PM_{2.5}$)	55	10
Oxides of Sulfur (SO_X)	250	40
Carbon Monoxide (CO)	550	100

SOURCE: SDAPCD 1998, and County of San Diego 2007.

TAC Health Risks

The latest 2015 guidance from the Office of Environmental Health Hazard Assessment (OEHHA 2015) was used to evaluate whether future operations at the project site would expose residents and workers to significant health risks. Health risks associated with TAC exposure fall into three categories: acute, chronic, and carcinogenic. Acute and chronic health risks consist of non-cancer health effects. Acute health risks are associated with exposures ranging from 1 to 8 hours. Chronic health risks are associated with exposures of 1 year or more. Carcinogenic health risks are associated with long-term exposures ranging from 25 to 70 years.

According to the County Guidelines and SDAPCD's Regulation XII: Prohibitions, Rule 1200: Air Contaminants, an incremental cancer risk greater than one in one million without implementation of BACTs, or greater than ten in one million with the application of BACTs, is a significant impact (SDAPCD 2015). In addition, a health hazard index greater than 1 would be deemed as having a potentially significant impact.

Odors

SDAPCD Rule 51 (Public Nuisance) prohibits emission of any material that causes nuisance to a considerable number of persons or endangers the comfort, health, or safety of any person. A project that proposes a use that would produce objectionable odors would be deemed to have a significant odor impact if it would affect a considerable number of off-site receptors.

GHG Emissions

The increased concentration of GHGs in the atmosphere has been linked to global warming, which can lead to climate change. Construction and operation of the project would incrementally contribute to GHG emissions along with past, present, and future activities, and the CEQA Guidelines acknowledge this as a cumulative impact. As such, impacts of GHG emissions are analyzed here on a cumulative basis.

As stated in Appendix G of the CEQA Guidelines, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the above determinations. The SDAPCD does not have quantitative thresholds for determining significance of construction or operational impacts. However, the County of San Diego provides guidance and thresholds for air quality analysis in their *County of San Diego 2015 GHG Guidance: Recommended Approach to Addressing Climate Change in CEQA Documents* (County of San Diego 2015). A screening threshold of 900 MT of CO_2e per year is being used by the County as a conservative criterion for determining the size of projects that would require further analysis and mitigation with regard to climate change. This screening threshold would achieve the State's objective of capturing 90 percent of the GHG emissions from new development projects in the residential/commercial sectors. If a project were to exceed the 900 MT of CO_2e per year threshold, the project would have a cumulatively considerable impact.

For significance threshold 5, the annual threshold of 900 MT of CO_2e proposed by the County will be used as a screening level for determining the significance of the project's GHG emissions.

For significance threshold 6, a project is determined to be less than significant if it does not conflict existing plans or policies implemented for the reduction of GHG emissions.

4.2 Methodology

Construction Air Quality Impacts of the Complete Streets Improvements

Air pollutant emissions associated with the Complete Streets improvements would result from construction activities that would generate air pollutant emissions in the project area, and on surrounding roadways resulting from construction-related traffic. Short-term construction-generated emissions of criteria air pollutants and O_3 precursors associated with the Complete Streets improvements were modeled using the California Emissions Estimator Model (CalEEMod), Version 2016.3.1, as recommended by SDAPCD. CalEEMod was used to determine whether short-term construction-related emissions of criteria air pollutants associated with the Complete Streets improvements would exceed the thresholds previously identified, and whether mitigation would be required. The modeling was based on project-specific construction data provided by the City, where available. Where project-specific information was not available, reasonable assumptions based on other similar projects and default model settings were used to estimate criteria air pollutant and O_3 precursor emissions. Modeling input and output files are provided in Appendix A of this report.

Construction emissions are considered short term and temporary, but have the potential to represent a significant impact with respect to air quality. PM (i.e., PM_{10} and $PM_{2.5}$) is among the pollutants of greatest localized concern with respect to construction activities. PM emissions from construction activities can lead to adverse health effects and nuisance concerns, such as reduced visibility and soiling of exposed surfaces. PM emissions can result from a variety of construction activities, including excavation, grading, demolition, vehicle travel on paved and unpaved surfaces, and vehicle and equipment exhaust. Construction emissions of PM can vary greatly depending on the level of activity, the specific operations taking place, the number and types of

equipment operated, local soil conditions, weather conditions, and the amount of earth disturbance.

Mobile source emissions generate primarily O_3 precursors of ROG and NO_X emissions, which vary as a function of vehicle trips per day associated with debris hauling, delivery of construction materials, vendor trips, and worker commute trips, and the types and number of heavy-duty, off-road equipment used and the intensity and frequency of their operation.

All construction projects in the SDAB must comply with SDAPCD Rule 55 for controlling fugitive dust, which would reduce regional PM_{10} and $PM_{2.5}$ emissions from construction activities. Specific Rule 55 control requirements include dust control measures for active operations, open storage piles, and inactive disturbed areas, as well as track-out and carry-out onto paved roads beyond a project site. Compliance with Rule 55 was accounted for in the project construction emissions modeling. Site watering would reduce the PM from becoming airborne, while washing of transport vehicle tires and undercarriages would reduce re-entrainment of construction dust onto the local roadway network.

Construction Air Quality Impacts of Projects Constructed under the Incentive District

Construction activities that would occur as a result of individual development and redevelopment projects implemented under the Incentive District have the potential to generate air pollution emissions as a result of potential future use of heavy-duty construction equipment, and future vehicle trips generated from construction workers traveling to and from construction sites. In addition, potential fugitive dust emissions would result from grading and construction activities and evaporative emissions would occur from the application of architectural coatings and the laying of asphalt pavement.

Specific future development projects, which may fall under the Incentive District, are unknown at this time. As a result, specific future project-level construction information, such as construction schedules and import and export soil quantities are not known. For the purposes of conducting an construction emissions impact assessment of projects constructed under the Incentive District provisions, an evaluation of the consistency with applicable CARB and SDAPCD measures to reduce construction-related emissions from the combustion of fossil fuels and the generation of fugitive dust is included in this analysis. The analysis also assesses consistency with construction measures in the San Diego County Air Quality Management Plan (AQMP). However, as future project-specific information of Incentive District development is not available at this time so this aspect of the project is addressed programmatically.

Operational Air Quality Impacts of the Project

The operation of the Complete Streets improvements would not result in an increase in vehicle trips or other secondary sources. Therefore, the Complete Streets improvements would not result in significant operational air quality impacts and are not further discussed in this analysis.

The operation of the Incentive District developments, once constructed, would potentially generate operational air pollutant emissions from mobile source and area source emissions and indirect sources of pollutant emissions associated electricity and natural gas consumption, water transport, and solid waste generation at the project-level. Because individual development projects that could be implemented as a result of adoption of the Incentive District have not been identified, proposed, or designed, it is not possible to accurately quantify the potential pollutant emissions associated with these individual projects. Thus, potential future operations-related air pollution emissions impacts are qualitatively assessed, including evaluating consistency with applicable CARB and SDAPCD measures to reduce operations-related emissions, andqualitatively assessing consistency with construction measures in the AQMP.

Development in the Incentive District area could also result in long-term increase in the use of TAC-containing products (fuels, maintenance products, etc.) and/or substantially contribute to increased TAC emissions from existing localized TAC sources. These TAC issues are also addressed in this analysis through the consideration of measures that would be implemented during the development permit review process to ensure potential significant TAC impacts would not occur.

Greenhouse Gas Emission Impacts of the Project

GHG emissions of the project's Complete Streets improvements were estimated using a similar methodology to that described above for criteria air pollutants. CalEEMod is also used for estimating construction and operational GHG emissions associated with land use projects. CalEEMod Version 2016.3.1 incorporates the most recent (2014) versions of the on-road vehicle emission factors (EMFAC) and the off-road emission factors (OFFROAD) models developed by CARB. CalEEMod estimates the GHG emissions of CO_2, CH_4, and N_2O as well as the resulting total CO_2e emissions associated with construction-related GHG sources such as off-road construction equipment, material delivery trucks, soil haul trucks, and construction worker vehicles. CalEEMod Version 2016.3.1 uses IPCC's AR4 to assign the GWPs for CH_4 and N_2O; therefore, GHG emissions estimated my CalEEMod are consistent with the GWPs used for the State's GHG emission inventories. For consistency, the GHG analysis incorporates assumptions similar to the air quality analysis. The total construction GHG emissions for the project were amortized (distributed) each year over a 30-year period (life-time of the project) and added to its annual operational GHG emission estimates (which are zero, as the improvements do not generate operational emissions). All GHG emission estimate assumptions and calculations are provided in Appendix A to this report.

Construction activities of the projects that could be constructed under the Incentive District provisions have the potential to generate future GHG emissions, as a result of the same construction activities previously identified for air quality emissions. The operation of the development projects that could be built under the Incentive District provisions would generate GHG emissions from mobile source and area sources, and indirect GHG sources associated with electricity and natural gas consumption, water transport, and solid waste generation at the project level. However, as future project-specific information of Incentive District development is not available at this time so this aspect of the project is addressed programmatically.

4.3 Project Impacts

Air Quality Emissions

Issue 1: Would the proposed project conflict with or obstruct implementation of the applicable air quality plan?

The SDAPCD RAQS is the regional air quality plan that is applicable the project area. The RAQS contains rules and regulations that are implemented by the SDAPCD to help the SDAB meet the clean air standards required by federal and state law. The RAQS relies on projected growth in the County as well as mobile, area, and other sources of emissions, as obtained from CARB and SANDAG to project future emissions within the County. Based on these emissions, reduction strategies are determined to reduce emissions in order to achieve or maintain attainment with state and federal standards. CARB mobile source emissions projections and SANDAG growth projections are generally based on the applicable General Plans (of the incorporated cities within the County and the County itself for the unincorporated areas). Therefore, projects that propose development consistent with the applicable General Plan would be consistent with the RAQS and the SIP. If the project's growth exceeds the projections anticipated in the applicable General Plan, then it would conflict with the RAQS and the SIP.

The Complete Streets improvements are a permitted use under the County's General Plan. Additionally, there is not expected to be population growth resulting from implementation of the Complete Streets improvements. Therefore, this component of project would be consistent with the growth projections accounted for in SDAPCD's RAQS, and it would not conflict with, or obstruct, implementation of the RAQS and impacts would be less than significant.

Construction emissions associated with the individual development projects that would occur under the Incentive District would be required to comply with the CARB promulgated emission standards for off-road diesel construction equipment, which would minimize exhaust emissions of PM_{10}, $PM_{2.5}$, and NO_X. As well, the growth and development that is anticipated to occur with implementation of the Incentive District is consistent with the City's existing General Plan and thus would be consistent with the SDAPCD's RAQS.

For these reasons, neither the Complete Streets improvements nor the development projects anticipated under the Incentive District would conflict with, or obstruct, implementation of the RAQS and impacts would be less than significant.

Issue 2: Would the proposed project violate any air quality standard or contribute substantially to an existing or projected air quality violation?

Complete Streets Improvements

The Complete Streets improvements would involve the conversion of the Coast Highway corridor from four lanes to two lanes, and phased construction of 12 new roundabout intersections, all of which are currently signalized, with the exception of the intersections with Washington Avenue, West Street, and Kelly Street, which currently are stop-sign controlled (IBI 2017). Construction

activities associated with the project would generate pollutant emissions from the following construction activities: demolition, site preparation, grading, and utility trenching; construction workers traveling to and from project area; delivery and hauling of construction supplies to, and debris from, the project area; fuel combustion by on-site construction equipment; facilities construction; and paving. These construction activities would temporarily create emissions of dust, fumes, equipment exhaust, and other air contaminants. The amount of emissions generated on a daily basis would vary depending on the intensity and types of construction activities occurring simultaneously at the time.

For the analysis of construction-period impacts for the Complete Streets improvement, the City of Oceanside estimated an inventory of the equipment that would be used during the peak day for each of the construction phases (e.g., demolition, site preparation, etc.). Using this data, the peak daily emissions of criteria air pollutants and O_3 precursors associated with the Complete Streets improvements worst-case construction scenario was modeled. The results of this analysis are provided in Table 6.

As shown in Table 6, the maximum daily construction emissions generated by the Complete Streets improvements worst-case construction scenario would not exceed SDAPCD's daily thresholds for any criteria pollutants during any of the construction phases. Because construction activities would likely be lower than the maximum daily levels shown on most days, and would be intermittent throughout the year, the annual construction emissions generated by the Complete Streets improvements worst-case construction scenario would also not exceed SDAPCD's annual thresholds. Therefore, the construction phase emissions of associated with the Complete Streets improvements project component would be less than significant.

TABLE 6
COMPLETE STREETS IMPROVEMENTS CONSTRUCTION EMISSIONS

	Estimated Maximum Daily Emissions (lbs/day)					
Construction Activities	**ROG**	**NO_X**	**CO**	**SO_X**	**PM_{10}**	**$PM_{2.5}$**
Demolition	6	51	42	<1	3	3
Site Prep (Vegetation Grubbing/clearing)	3	39	23	<1	2	1
Site grading	3	33	22	<1	2	1
Utility Trenching	2	17	13	<1	1	1
Facilities construction	4	40	29	<1	3	2
Facilities construction and Paving [a]	9	83	62	<1	5	4
Maximum Daily Emissions	9	83	62	<1	5	4
SDAPCD Thresholds	75	250	550	250	100	55
Significant Impact?	No	No	No	No	No	No

[a] Includes the sum of daily emissions from the construction phases Building Construction, Paving, and Architectural Coating, because these phases have the potential to overlap on the same day during the overall construction period. Consequently, the sum of these daily emissions represents the maximum daily emissions during the construction period; therefore, it is used as comparison to the SDAPCD screening-level thresholds.

SOURCE: ESA CalEEMod Modeling, August 2016; San Diego County Guidelines for Determining Significance 2007.

Operation of the Complete Streets improvements is not expected to result directly in an increase in emissions. According to the TIA prepared for the project (IBI 2017), the Complete Streets improvements are not expected to result in any net increases in vehicle trips when compared to existing baseline conditions. Therefore, operation of the Complete Streets improvements would result in no impacts.

Incentive District

Construction of Projects Implemented under the Incentive District

Future project-specific construction activities that would occur as a result of the Incentive District would cause temporary, short-term emissions of nonattainment air pollutants in the SDAB of O_3 precursors (i.e., VOCs and NO_X), and PM_{10} and $PM_{2.5}$ as a result of construction activities, including: (1) grading, excavation, road building, and other earth moving activities; (2) travel by construction equipment and employee vehicles, especially on unpaved surfaces; (3) exhaust from construction equipment, trucks, and worker vehicles; (4) architectural coatings; and (5) asphalt paving. Information regarding the size, duration, and construction requirements of specific development projects would be required in order to quantify impacts associated with the construction activities of these individual projects. However, what is known at this time is that the construction of potential future projects under the Incentive District would be required to comply with applicable State and SDAPCD air quality regulations, including CARB's on-road and off-road vehicle rules on idling limits and meeting stringent NO_X, PM_{10}, and $PM_{2.5}$ exhaust standards; and SDAPCD Rules 55 and 51 (Fugitive Dust and Nuisance) that limit fugitive dust emissions. Additionally, the maximum residential density in the Incentive District would allow for 65 dwelling units per acre. Retail and commercial uses would also be allowed within the Incentive District.

Individual development projects could exceed the SDAPCD thresholds specified for daily emissions of criteria air pollutants (see Table 5). Thus, even with compliance of these rules and regulations, future construction activities associated with the land uses permitted by the Incentive District would have the potential to contribute substantially to an existing or projected air quality violation. Therefore, this impact would be potentially significant.

To reduce the potential for significant impacts, the following mitigation measures would be required for individual projects developed using the Incentive District regulations.

> **MM Incentive District AIR-1a:** Prior to the issuance of a grading or building permit, whichever is required to be obtained first, individual development projects proposed under the Incentive District shall comply with the following land preparation, excavation, and/or demolition mitigation measures during construction activities:
>
> - All soil excavated or graded should be sufficiently watered to prevent excessive dust. Watering should occur with complete coverage of disturbed soil areas. Watering should be a minimum of twice daily on unpaved/untreated roads and on disturbed soil areas with active operations.

- All clearing, grading, earth moving and excavation activities should cease: (a) during periods of winds greater than 20 mph (averaged over one hour as measured by an on-site anemometer or an off-site anemometer that is representative of the construction area), if disturbed material is easily windblown, or (b) when visible dust plumes impact public roads, occupied structures or neighboring property.
- Vehicles traveling over unpaved roadways shall be limited to 15 miles per hour or less. Signs shall be posted at construction sites identifying the maximum speed limit.
- All trucks hauling dirt, sand, soil, or other loose material shall be covered or maintain at least 2 feet or freeboards, in accordance with the requirements of California Vehicle Code (CVC) Section 23114.
- If more than 5,000 cubic yards of fill material will be imported or exported from the site, then all haul truck access points shall be equipped with a gravel pad, rumble pad, or similar control to reduce vehicle trackout.
- Adjacent streets with visible dust, dirt, sand, or soil material accumulation shall be cleaned and the accumulated material removed using street sweepers.
- Stockpiles of soil or other fine loose material shall be stabilized by watering, covered with tarp, or other appropriate method to prevent wind-blown fugitive dust.
- Where acceptable to the local fire department, weed control should be accomplished by mowing instead of digging, thereby, leaving the ground undisturbed and with a mulch covering.

MM Incentive District AIR-1b: Prior to the issuance of a grading or building permit, whichever is required to be obtained first, individual proposed projects shall comply with the following construction equipment mitigation measures:

- Construction equipment, on-road trucks, and emission control devices shall be properly maintained and tuned in accordance with manufacturer specifications.
- Construction contractors shall be required to comply with California's on-road and off-road vehicle emissions regulations, including the CARB idling restrictions and the USEPA/CARB on-road and off-road diesel vehicle emissions standards, as required by 13 CCR, Sections 2485, 2025(h), and 2449.

MM Incentive District AIR-1c: Construction contractors shall ensure that interior architectural coatings have a maximum of 10 grams per liter of VOC for both residential and commercial development.

While implementation of **MM Incentive District AIR-1a through 1c** represents feasible measures to reduce potential impacts associated with construction, impacts would not be reduced to a less-than-significant level. Additional feasible measures cannot be developed without knowing the exact timing or location of the construction projects. Because there is no way to accurately predict the intensity of development projects under the Incentive District or their implementation timing, this impact is considered potentially significant and unavoidable.

Assuming implementation of **MM Incentive District AIR-1a through AIR-1c**, a maximum of 65 dwelling units per acre, and up to 30,000 square feet of retail development per acre, the following development could occur simultaneously and result in less than significant impacts (i.e. emissions below the daily emissions thresholds):[3]

- up to six 1-acre lots;
- up to three 2-acre lots;
- up to one 5-acre and four 1-acre lots;
- up to one 5-acre lot and two 2-acre lots; or
- up to two 5-acre lots.

However, development exceeding these levels would likely result in emissions above the daily thresholds resulting in short-term emissions of nonattainment air pollutants which would result in a significant contribution to existing or projects air quality violations.

Operation of Projects Developed under the Incentive District

In addition to potential construction-period effects, the potential development projects under the Incentive District would result in mobile source emissions generated by vehicle trips from future development and population growth. Information regarding specific development projects, trip generation, and locations of sensitive receptors in relation to potential future projects would be needed in order to quantify the level of impact associated with operational activities. As this additional level of detail is not available at this time and would be speculative to estimate a detailed analysis is not possible.

Operational emissions from future development projects that could occur as a result of adoption of the Incentive District would generate long-term emissions of nonattainment air pollutants in the SDAB of O_3 precursors (i.e., VOCs and NO_X), PM_{10} and $PM_{2.5}$ as a result of normal day-to-day activities. Future development that could result through adoption of the Incentive District could result in an increase in overall area density. However, the new buildings would be built to meet or exceed increasingly more energy efficient Title 24 standards. According to the CEC, the Title 24 (2016) standards, which are effective January 1, 2017, result in approximately 28 percent less energy for residential and 5 percent less energy for nonresidential lighting, heating, cooling, ventilation, and water heating compared to the previous Title 24 (2013) standards. It is expected that future updates to the Title 24 standards would result in increased energy efficiency. The next iteration of the Title 24 standards are anticipated in 2019; however, estimated buildings energy reductions from these future standards are not yet known or available.

The California Public Utilities Commission (CPUC) has also designed the Zero Net Energy (ZNE) Action Plan to make new residential and commercial construction in California zero net energy by 2030 in order to meet the state's greenhouse gas goals. The ZNE Action Plan's key

[3] Since the average lot size is between one and two acres, the analysis focused on one and two acres with a maximum of 5 acres as an outside development size.

milestones are achieved by improving and expanding Title 24 standards, providing incentives, mandating carbon benchmarking and labeling, and developing performance data.

It is not possible to accurately predict the increased level of energy efficiency associated with future updates to the Title 24 standards. Furthermore, Title 24 only regulates a portion of a buildings energy usage primarily related to lighting, heating, cooling, ventilation, and water heating; therefore, is it not possible to speculate how future Title 24 standards would affect the overall energy profile of a building. Nonetheless, it is reasonable to assert that future buildings built as a result of adoption of the Incentive District would likely replace less energy efficient buildings and result in improved energy efficiency on a per dwelling unit or per square foot basis. Nonetheless, buildout of future development projects that could occur as a result of adoption of the Incentive District could result in increased overall density, which may result in an overall increase in building energy emissions. Similarly, with increased density, population may increase as a result of adoption of the Incentive District and result in increased overall evaporative emissions (i.e., VOCs) from consumer products and architectural coatings.

The TIA for the project shows that daily per capita vehicles miles traveled (VMT) under future year 2035 with project conditions would be approximately 6.36 VMT per capita compared to the 2008 model base year VMT of 6.56 VMT per capita (IBI 2017). The future year 2035 without the project would be approximately 7.11 VMT per capita (IBI 2017). Thus, VMT per capita would be reduced with the project compared to the 2008 model base year and future no project conditions by approximately 3 percent and 11 percent, respectively. Therefore, the project would result in increased transportation efficiency on a per capita basis relative to the 2008 model base year and future year 2035 no project conditions, and would reduce per capita mobile source emissions. This reduction in per capita VMT is supportive of per capita VMT reduction efforts in the SANDAG 2050 RTP and SCS.

Per capita emissions of mobile source exhaust pollutants (from vehicles), in particular VOC, NO_X, and CO, are expected to decline in future years relative to existing conditions due to improved vehicle emission standards and fuel economy standards that have been adopted by the USEPA and State of California (i.e., emissions standards through vehicle model year 2025). Under current USEPA standards, by vehicle model year 2025, passenger cars and light-duty trucks are required to achieve 54.5 miles per gallon (if emissions reductions are achieved exclusively through fuel economy improvements) and 163 grams of CO_2 per mile. According to the USEPA, a model year 2025 vehicle would be required to achieve 54.5 mpg (if GHG reductions are achieved exclusively through fuel economy improvements) and 163 grams of CO_2 per mile and would emit approximately one-half of the GHG emissions from a model year 2010 vehicle (USEPA 2012). Nonetheless, future development that could occur as a result of adoption of the Incentive District could result in an increase in the total amount of VMT due to increased overall density, which may result in an overall increase in mobile source emissions, despite the improved transportation efficiency and per capita emissions reductions expected from mobile sources meeting increasingly more stringent vehicle emissions standards.

For these reasons, the operation of the projects developed under the Incentive District would result in potentially significant impact. To reduce these impacts, the following mitigation measures shall be required for projects developed under the Incentive District regulations.

> **MM Incentive District AIR-2:** Prior to the issuance of a building permit, individual development projects proposed under the Incentive District regulations shall comply with the following mitigation measures:
>
> a. Provide direct pedestrian and bicycle access from any Incentive District residential development with a density of four or more residences per acre and in any mixed-use or commercial development to off-site adjacent neighborhood amenities, parks, schools, shopping areas, existing bike paths, and transit stops. Low, medium, and high density Incentive District developments shall have curbs and sidewalks on both sides of the street.
>
> b. For medium to high density residential, mixed-use, or commercial developments in the Incentive District area where transit services exist but no transit stop is located within one-half mile of the development site or where transit service does not exist and the development project is within a transit district's sphere of influence, development projects shall provide plans indicating locations of bus turnouts and loading areas with shelters that are acceptable to the local transit provider.
>
> c. Promote the expanded use of renewable fuel and low-emission vehicles by including one or both of the following project components: provide preferential parking for ultra-low emission, zero-emission, and alternative-fuel vehicles; and/or provide electric vehicle supply equipment within the development that meets or exceeds the Tier 1 requirements in the California Green Building Standards.
>
> d. Development projects shall be required to reduce energy consumption by designing buildings that meet or exceed the Tier 1 building energy budget requirements in the California Green Building Standards.
>
> e. Development projects shall be required to reduce water consumption by installing water-efficient fixtures, appliances, toilets/urinals, and landscape irrigation systems that meet or exceed the Tier 1 requirements in the California Green Building Standards.

As detailed information regarding individual development projects within the Incentive District is not currently available, it cannot be determined with certainty that the above measures would reduce impacts to a less than significant level. Additional feasible measures beyond the mitigation provided by **MM Incentive District AIR-2** cannot be developed without knowing the exact nature of the proposed developments including but not limited to the types and sizes of the proposed uses and associated trip generation rates. Because there is no way to accurately predict the nature or intensity of development projects under the Incentive District, this impact is considered significant and unavoidable.

Issue 3: Would the proposed project expose sensitive receptors to substantial pollutant concentrations?

The two primary emissions of concern regarding health effects for land development projects are diesel PM and CO. Separate discussions are provided below analyzing the potential for sensitive receptors to be exposed to CO hotspots, and TACs from on-site sources during project construction and operations.

CO Hotspots

A project would expose sensitive receptors to substantial pollutant concentrations if it places sensitive receptors near CO hotspots or creates CO hotspots near sensitive receptors. The project would result in a significant impact if the intersection improvements and realignment of trips associated with the Complete Streets improvements result in CO emissions, that when added to the ambient concentrations, would exceed a 1-hour concentration of 20 parts per million (ppm) or an 8-hour average of 9 ppm. As detailed in Sections 3.1 and 3.2, and for purposes of this analysis, the project would be compared to a screening level for the intersection improvements associated with the Complete Streets improvements. If the intersection improvements do not exceed the screening levels, then they would be assumed to not exceed the 1- or 8-hour standards. However, if the intersection improvements degrade the LOS below D (change from LOS D to E or E to F) with peak hourly traffic flows of greater than 3,000 vehicles, impacts would be potentially significant.

The existing plus project peak hour conditions were evaluated against the screening level thresholds. LOS for study area intersections with project intersection degraded to below LOS D during the a.m. or p.m. periods is shown in Table 7.

TABLE 7
TRAFFIC INTERSECTIONS LEVEL OF SERVICE – EXISTING + PROJECT

Intersection (Numbering per IBI 2017)	Peak Hour	Existing LOS	Existing + Project LOS	Peak Hourly Flow
27. Coast Highway - Oceanside Boulevard	AM	C	A	**1,191**
	PM	D	F	**2,551**
35. Coast Highway – Cassidy Street	AM	A	A	**926**
	PM	B	F	**1,991**

SOURCE: IBI 2017.

As shown in Table 7, the LOS changes from D or better to F at two intersections during the peak p.m. hour; however, the peak hourly flow for the Coast Highway-Oceanside Boulevard intersection and Coast Highway-Cassidy Street intersection would be 2,551 and 1,991 vehicles, respectively, which would be under the screening level of 3,000 vehicles during a peak hour. Thus, the Complete Streets improvements would not expose sensitive receptors to substantial concentrations of CO. Therefore, the impact is less than significant.

In addition to the different roadway configurations, the traffic analysis conducted for the project accounts for a different land use conditions in the Future 2035 with Project scenario. This scenario accounts for the Complete Streets improvements and the development and/or redevelopment which may occur under the Incentive District. As shown in Table 8, the intersections with LOS changes to E or F during the peak a.m. or p.m. hours would not result in peak hourly flow exceeding 3,000 vehicles during a peak hour. Thus, the Complete Streets improvements and the development and/or redevelopment which may occur under the Incentive District would not expose sensitive receptors to substantial concentrations of CO. Therefore, the impact is less than significant.

TABLE 8
TRAFFIC INTERSECTIONS LEVEL OF SERVICE – FUTURE (2035) + PROJECT

Intersection (Numbering per IBI 2017)	Peak Hour	Future (2035 without Project) LOS	Future (2035 with Project) LOS	Peak Hourly Flow
4. Coast Highway - Surfrider Way	AM	B	A	1,216
	PM	B	F	2,381
15. Seagaze Street - Ditmar Street	AM	A	A	553
	PM	D	F	1,495
21. Coast Highway - Wisconsin Avenue	AM	B	A	1,047
	PM	B	E	2,079
26. Oceanside Boulevard - Tremont Street	AM	B	B	582
	PM	C	E	1,044
27. Coast Highway - Oceanside Boulevard	AM	B	B	1,264
	PM	E	F	2,634
29. Coast Highway - Morse Street	AM	B	A	1,117
	PM	B	F	2,149
35. Coast Highway - Cassidy Street	AM	B	B	986
	PM	B	F	2,116
40. Coast Highway - Vista Way	AM	C	C	1,429
	PM	D	E	2,866
42. Vista Way- Ditmar Street	AM	B	C	1,423
	PM	D	F	2,519
43. Vista Way- Stewart Street	AM	B	C	1,634
	PM	C	E	2,829

SOURCE: IBI 2017.

Toxic Air Contaminants

Complete Streets Improvements

Project construction of the Complete Streets improvements would result in short-term emissions of diesel PM, which is a TAC. Diesel PM poses a carcinogenic health risk that is measured using an exposure period of 70 years. The exhaust of off-road heavy-duty diesel equipment would emit diesel PM during demolition, site preparation (e.g., clearing); site grading and excavation; paving; installation of utilities, materials transport and handling; facilities construction; and other

miscellaneous activities. SDAPCD has not adopted a methodology for analyzing such impacts and has not recommended that health risk assessments (HRA) be completed for construction-related emissions of TACs.

According to the OEHHA, carcinogenic health risk assessments, which determine the exposure of sensitive receptors to TAC emissions, should be based on a 30-year residential exposure period; however, such assessments should be limited to the period or duration of activities associated with the project. The construction period for the Complete Streets improvements project component would be much less than the 30-year period used for risk determination. Because off-road heavy-duty diesel equipment would be used only for short time periods, project construction would not expose sensitive receptors to substantial emissions of TACs. Therefore, this impact would be less than significant.

Incentive District

Construction-related activities could also result in the emission of TACs affecting nearby sensitive receptors. The primary TACs that could be emitted during construction would be diesel PM from construction equipment exhaust. Diesel PM exhaust is a complex mixture of thousands of gases and fine particles commonly known as "soot." Diesel PM is emitted by heavy equipment operations during grading, excavation, and transportation activities. Health risks from carcinogenic TACs are usually described in terms of cancer risk. Cancer risk is the likelihood that a person exposed to concentrations of TACs over 30 years or more would contract cancer, based on the use of standard risk-assessment methodology. Diesel PM also represents a chronic health hazard from exposures of a year or more.

The construction period for the potential development and redevelopment of an individual project as result of adoption of the Incentive District would be much less than the 30-year period used for risk determination for residential exposures. Because off-road heavy-duty diesel equipment would be used only for short time periods of generally one to two years for typical development projects, project-level construction during future development projects would typically not expose sensitive receptors to substantial emissions of TACs that exceed the established significance thresholds. However, given the potential amount of development associated with implementation of the Incentive District, it is reasonable to assume that on a programmatic-level, some large-scale construction activities could occur in proximity to sensitive receptors that could expose sensitive receptors to substantial emissions of TACs that exceed the established significance thresholds, thereby potentially resulting in significant impacts.

In addition, potential development and redevelopment under the Incentive District would generally result in an increase in density in the project corridor, and it is possible that sensitive uses could be located near sources of TAC emissions within the distances specified in the CARB advisory recommendations (see Table 9). For these reasons, impacts related to operational TAC emissions would be considered potentially significant when considering the various development projects that could be constructed under the Incentive District.

TABLE 9
CARB RECOMMENDATIONS ON SITING NEW SENSITIVE LAND USES

Source Category	Advisory Recommendations
Freeways and High-Traffic Roads	• Avoid siting new sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles per day, or rural roads with 50,000 vehicles per day.
Distribution Centers	• Avoid siting new sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating transport refrigeration units (TRUs) per day, or where TRU unit operations exceed 300 hours per week). • Take into account the configuration of existing distribution centers and avoid locating residences and other new sensitive land uses near entry and exit points
Dry Cleaners using Perchloroethylene	• Avoid siting new sensitive land uses within 300 feet of any dry cleaning operation. For operations with two or more machines, provide 500 feet. For operations with 3 or more machines, consult with the local air district. • Do not site new sensitive land uses in the same building with perchloroethylene dry cleaning operations.
Gasoline Dispensing Facilities	• Avoid siting new sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). • A 50-foot separation is recommended for typical gas dispensing facilities.

SOURCE: California Air Resources Board, Air Quality and Land Use Handbook: A Community Health Perspective, (2005).

The following mitigation measure would be required to reduce TAC impacts for the individual development projects that are proposed under the Incentive District.

MM Incentive District AIR-3: Prior to the issuance of a grading or building permit, whichever is required first, individual development projects proposed under the Incentive District shall comply with the following requirements:

a. Projects locating sources of TAC emissions near sensitive receptors within the advisory guideline recommendations in the CARB *Air Quality and Land Use Handbook* (or future adopted subsequent document) shall conduct a health risk assessment to sufficiently demonstrate that impacts would not exceed the adopted significance thresholds inclusive of project-level design features, as appropriate and feasible. The types of projects that would be required to comply with this measure and more detail on the required features and recommendations are provided in Table 9 (CARB Recommendations on Siting and New Sensitive Land Uses).

b. Projects requiring the use of diesel-fueled heavy-duty construction equipment that generates on-site emissions of one (1) pound per day of diesel particulate matter or more for a period of six-months or more within 500 feet of sensitive receptors shall conduct a health risk assessment to sufficiently demonstrate that impacts would not exceed the adopted significance thresholds inclusive of project-level design features, as appropriate and feasible.

Implementation of **MM Incentive District AIR-3** would reduce potential TAC impacts to a less-than–significant level.

Odors

Issue 4: Would the proposed project create objectionable odors affecting a substantial number of people?

Land uses that are associated with odor complaints typically include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding. Neither the Complete Streets improvements nor the Incentive District would include these land uses that are typically associated with odor generation.

During construction, exhaust from equipment, and activities associated with the application of pavement, finishes, or paints may produce discernible odors typical of most construction sites. Such odors would be temporary sources of nuisance to adjacent uses, and would not affect a substantial number of people. As well, odors associated with construction would be temporary and intermittent in nature.

For these reasons, the proposed project would not result in objectionable odors for the neighboring uses and impacts would be less than significant.

Cumulative Air Quality for Non-Attainment Pollutants

Issue 5: Would the proposed project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

The proposed project is located within the SDAB, which is considered the cumulative study area for air quality. Because the SDAB is currently classified as a state nonattainment area for O_3, PM_{10}, and $PM_{2.5}$, cumulative development consisting of the project along with other reasonably foreseeable future projects in the SDAB as a whole could violate an air quality standard or contribute to an existing or projected air quality violation. However, based on the County's Guidelines regarding cumulative air quality impact methodology, the County recommends that if an individual project results in air emissions of criteria pollutants (ROG, CO, NOx, SOx, PM_{10}, and $PM_{2.5}$) that exceed the screening level thresholds for project-specific impacts, then it would also result in a cumulatively considerable net increase of these criteria pollutants for which the project region (SDAB) is in non-attainment under an applicable federal or state ambient air quality standard.

Complete Streets Improvements

As shown in Table 6, the construction emissions associated with the Complete Streets improvements would not exceed SDAPCD's screening level thresholds. Operation of the Complete Streets improvements is not expected to result directly in an increase in emissions.

Thus, because the project's construction-period and operational impacts would be less than significant, the project would not result in a significant cumulative impact when considered with other past, present and reasonably foreseeable projects. Furthermore, the Complete Streets improvements would also be consistent with SDAPCD's RAQS. The project would not conflict with SDAPCD's air quality planning efforts for nonattainment pollutants and would not lead to a cumulatively considerable net increase in nonattainment pollutants during operations. Therefore, impacts would be less than significant on a cumulative basis.

Incentive District

Implementation of the Incentive District would generate pollutant emissions from construction and operation al emissions from potential future development under the Incentive District. Future development that could occur as a result of adoption of the Incentive District could result in an increase in density or in the total amount of VMT relative to existing conditions, which may result in an overall increase in building and mobile source emissions, despite the improved energy and transportation efficiency and emissions reductions expected from buildings and mobile sources meeting increasingly more stringent energy efficiency and vehicle emissions standards. **MM Incentive District AIR-1a though AIR-1c**, and **MM Incentive District AIR-2** would reduce construction and operational emissions from future development that could occur as a result of adoption of the Incentive District. However, detailed information regarding individual development projects within the Incentive District is not currently available. Thus, it cannot be determined with certainty that the above measures would reduce impacts to a less than significant level. Additional feasible measures beyond the mitigation identified above cannot be developed without knowing the exact nature of the proposed developments including but not limited to the types and sizes of the proposed uses and associated trip generation rates. Therefore, development under the Incentive District would potentially result in a cumulatively considerable net increase of a criteria pollutant for which the project region is non-attainment. Therefore, impacts would be significant and unavoidable.

Greenhouse Gas Emissions

Issue 5: Would the proposed project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

Complete Streets Improvements

The Complete Streets improvements are expected to result in a change in GHG emissions only during construction. Construction-related GHG emissions for the Complete Streets improvements were estimated using the same assumptions as the air quality analysis, and accounts for the completion of 12 roundabouts and associated Complete Streets improvements. Total estimated construction-related GHG emissions are shown in Table 10.

As shown in Table 10, the total estimated GHG emissions during construction of the Complete Streets improvements would be approximately 1,858 MT of CO_2e, which would equal to approximately 62 MT of CO_2e per year after amortization over 30 years.

TABLE 10
ESTIMATED TOTAL CONSTRUCTION GHG EMISSIONS

Emission Source	Estimated CO_2e Emissions
Total Construction Emissions (2017)	1,858 (MT)
Annual Construction (Amortized over 30 years)	**62 (MT/yr)**

CO_2e= carbon dioxide equivalent; MT =metric tons; MT/yr = metric tons per year.

SOURCE: ESA CalEEMod Modeling, August 2016.

The operation of the Complete Streets improvements is not expected to result directly in changes in area/indirect sources of GHG emissions associated with electricity and natural gas consumption, water transport, and solid waste generation. According to the TIA prepared for the project (IBI 2017), the Complete Streets improvements are not expected to result in any net increases in vehicle trips when compared to existing baseline conditions. Therefore, operation of the Complete Streets improvements would result in no impacts. The combined construction and operational impacts from the Complete Streets improvements would be ***less than significant*** as GHG emissions would not exceed the threshold.

Incentive District

Information regarding specific future redevelopment projects within the Incentive District would be needed in order to quantify the level of impact associated with construction activities. However, given the amount of potential development associated with implementation of the Incentive District, it is reasonable to assume that on a programmatic-level, some large-scale construction activities with specific construction schedules and scenarios (i.e., emissions per day) could exceed thresholds and result in a significant impact. Construction of the Incentive District would be dependent on the market needs, however based on the analysis described under Issue 2 above, the maximum emissions would be 1,738 MT CO_2e annually with an amortized rate of 58 MT CO_2e annually.

The operation of the potential future redevelopment within the Incentive District would result in a change in area and indirect sources of GHG emissions associated with electricity and natural gas consumption, water transport, and solid waste generation. In addition, development under the Incentive District would add vehicle trips to the future traffic volumes when compared to existing baseline traffic volumes (IBI 2017). The traffic analysis conducted for the project accounts for different land use conditions in the Future 2035 with Project scenario. This scenario accounts for the Complete Streets improvements and the development and/or redevelopment which may occur under the Incentive District.

Total GHG Emissions

Complete Streets Improvements

The estimated operational GHG emissions resulting from the Complete Streets improvements are shown in Table 11**,** and only the construction-related GHG emissions contributes to the overall GHG emissions (i.e., no change in operation emissions). As shown in Table 11, the total net annual GHG emissions associated with the Complete Streets improvements would be approximately 62 MT of CO_2e per year (detailed calculations are included in Appendix A of this report), which would not exceed the County's proposed screening level threshold of 900 MT of CO_2e per year. Therefore, the net increase in GHG emissions associated with the Complete Streets improvements would be less than significant.

TABLE 11
ESTIMATED CONSTRUCTION GHG EMISSIONS

Emission Source	Estimated Emissions CO_2e (MT/yr)
Annual Construction (Amortized over 30 years)	***62***
Total Annual GHG Emissions	***62***
Screening Level Threshold	***900***
Significant Impact?	No

CO_2e= carbon dioxide equivalent; MT/yr = metric tons per year; %=percent.

SOURCE: ESA CalEEMod Modeling, August 2016.

Incentive District

Information regarding specific development projects within the Incentive District, such as trip generation, and energy usage, would be needed in order to quantify GHG emissions from construction and operational activities. Project development screening levels were evaluated to determine typical project types and sizes that would result in a net change in GHG emissions less than the threshold of significance. In general, individual residential and commercial projects that would be developed pursuant to adoption of the Incentive District that result in a net increase in development over existing project site conditions less than the following screening levels would likely not exceed the GHG screening threshold individually:

- Mid-rise residential up to a net increase of 66 dwelling units over existing site conditions;
- Fast food restaurant with drive through up to a net increase of 2,930 square feet over existing site conditions;
- High-turnover sit down restaurant up to a net increase of 8,080 square feet over existing site conditions;
- Strip mall retail up to a net increase of 23,500 square feet over existing site conditions; and
- General office building up to a net increase of 50,000 square feet over existing site conditions.

Example mixed-use project scenarios that would result in a net increase in development over existing project site conditions less than the following screening levels would likely not exceed the GHG screening threshold individually:

- Mixed-use consisting of the following uses:
  - Mid-rise residential up to a net increase of 25 dwelling units over existing site conditions;
  - Fast food restaurant with drive through up to a net increase of 1,400 square feet over existing site conditions; and
  - Strip mall retail up to a net increase of 3,350 square feet over existing site conditions.
- Mixed-use consisting of the following uses:
  - Mid-rise residential up to a net increase of 30 dwelling units over existing site conditions;
  - High-turnover sit down restaurant up to a net increase of 2,800 square feet over existing site conditions; and
  - General office building up to a net increase of 10,000 square feet over existing site conditions.

Individual projects that exceed the land use screening levels above, or an equivalent combination/proportion of the land use screening levels for a mixed-use development, could potentially exceed the GHG screening threshold. As discussed in Section 3.6, in October 2016, the City is in the process of developing an E-CAP (i.e., Climate Action Element), the purpose of which is to identify how the City can do its part to achieve State GHG emission reduction goals, provide measures for the City to mitigate its GHG emissions impact, and establish a method to determine whether future actions, such as approval of development projects, are consistent with the GHG emission reduction goals. The E-CAP is not available and is anticipated to be released in 2018. As such, project consistency with the E-CAP cannot be evaluated at this time. Nonetheless, it is expected that individual development projects within the Incentive District would undergo a consistency analysis with applicable measures in the E-CAP after adoption through the public process, which could potentially streamline the determination of GHG impacts under CEQA.

As the California Air Pollution Control Officers Association (CAPCOA) notes, the question of potential impacts to climate change from increases in GHG emission is uniquely cumulative in nature (CAPCOA 2008). Emissions from the operation of development projects would arise largely from mobile sources and electricity production, and both are sources of emissions regulated at the State level with clear mandates and milestones to reduce the GHG intensity of vehicular fuels and supplied power. As discussed above, current and future Title 24 standards will result in highly efficient buildings, with relatively low GHG footprints. The Title 24 standards also require that new buildings are "solar ready" and provide appropriate equipment and wiring and solar zone, which is a section of the roof designated and reserved for the future installation of a solar electric or solar thermal system.

However, given the amount of development that could occur with implementation of the Incentive District, it is reasonable to assume that in the aggregate, development projects could

eventually result in a net increase in GHG emissions over current emission levels in excess of the County's proposed screening level threshold which is 900 MT of CO_2e per year. Therefore, implementation of the Incentive District could result in significant GHG emissions, and mitigation is required. Compliance with current and future Title 24 standards and **MM Incentive District AIR-2** would result in development projects which are more energy efficient than current development, relying on a wide array of strategies such as, possibly, solar water heating and photovoltaic roofs, Energy Star® appliances, etc., resulting a reduction in GHG emissions as compared to current practices. There are no additional feasible mitigation measures available. Thus, even with **MM Incentive District AIR-2**, the net increase in GHG emissions in the aggregate could exceed thresholds, and impacts are considered significant and unavoidable.

Consistency with GHG Emissions Reduction Plans or Policies

Issue 6: Would the proposed project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs?

Of the Recommended Actions contained in CARB's Scoping Plan, the actions that are most applicable to the project would be Actions T-3 (Regional Transportation-Related Greenhouse Gas Targets). CARB Scoping Plan Action T-3 aims to reduce GHG reductions by increasing access to a variety of mobility options such as transit, biking, and walking.

The Complete Streets improvements project component would be designed to allow for continuous bicycle facilities and streetscape improvements, and therefore, is consistent with the recommended actions in the CARB's Scoping Plan. Therefore, the Complete Streets improvements portion of the project would be consistent with the Scoping Plan measures.

Similarly, the Incentive District would be designed to allow for continuous bicycle facilities and streetscape improvements, and therefore is consistent with this recommendation in the CARB Scoping Plan. The Incentive District's goal is to increase population density and revitalization of the community. This is consistent with regional plans to reduce transportation-related GHG emissions as part of the overall statewide strategy under AB 32. The project would be supportive of the goals and benefits of the SANDAG RTP/SCS, which seeks "to guide the San Diego region toward a more sustainable future by integrating land use, housing, and transportation planning to create communities that are more sustainable, walkable, transit-oriented, and compact" (SANDAG 2011). As discussed previously, the TIA for the project shows that daily per capita VMT under future year 2035 with project conditions would be reduced compared to the 2008 model base year and future no project conditions by approximately 3 percent and 11 percent, respectively (IBI 2017). The project would reduce per capita VMT by locating more people in proximity to residential and commercial land uses and services, which would also revitalize the community. Because both the Complete Streets improvements and Incentive District would be generally consistent with the Scoping Plan measures and the SANDAG RTP/SCS, and impacts would be less than significant.

As discussed previously, the City is in the process of developing an E-CAP with an anticipated release date in 2018. As such, project consistency with the E-CAP cannot be evaluated at this

time. Nonetheless, it is expected that individual development projects within the Incentive District would undergo a consistency analysis with applicable measures in the E-CAP after adoption through the public process, which could potentially streamline the determination of GHG impacts under CEQA and provide additional evidence supporting the project's consistency with applicable GHG reduction plans and policies.

4.4 Cumulative Impacts

CEQA Guidelines require a discussion of cumulative impacts of a project "when the project's incremental effect is cumulatively considerable" (2011 CEQA Guidelines, Section 15130). As defined by Section 15065 (a)(3) "cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (2011 CEQA Guidelines, Section 15065 (a)(3)). These cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines Section 15355).

This cumulative impacts section provides a cumulative impact analysis of the entire project (Complete Streets improvements and the Incentive District) separately for project construction and project operation. Construction and operation of the entire project would include future development projects that have not yet been proposed. Since the City has no control over the timing or sequencing of the cumulative project, any quantitative analysis to ascertain daily construction emissions that assumes multiple, concurrent construction future development projects would be speculative. For this reason, the methodology to assess a project's cumulative impact differs from the cumulative impacts methodology employed for other environmental issue areas. For air quality, the project-specific air quality significance thresholds are used to determine the potential cumulative impacts to regional air quality.

With respect to emissions of GHGs, potential impacts to climate change from increases in GHG emission is uniquely cumulative in nature (CAPCOA 2008). The California Natural Resources Agency has clarified that the CEQA Guidelines amendments focus on the effects of GHG emissions as cumulative impacts, and that they should be analyzed in the context of CEQA's requirements for cumulative impact analysis (see Section 15064(h)(3)).[4] Therefore, the project-level analysis provided above serves as a cumulative impact assessment for GHG emissions.

Air Quality

The project would result in the emission of criteria pollutants during construction of the Complete Streets improvements and the development of the Incentive District. Based on the project-specific level of emissions, the project's cumulative impacts would be potentially significant because its maximum daily construction emissions could potentially exceed the SDAPCD screening level

[4] See generally California Natural Resources Agency, Final Statement of Reasons for Regulatory Action (December 2009), pp. 11-13, 14, 16; see also Letter from Cynthia Bryant, Director of the Office of Planning and Research to Mike Chrisman, Secretary for Natural Resources, April 13, 2009, https://www.opr.ca.gov/docs/Transmittal_Letter.pdf, accessed December 2016.

thresholds for maximum daily emissions. As detailed information regarding individual development projects within the Incentive District is not currently available, it cannot be determined with certainty that **MM Incentive District AIR-1a through AIR-1c** would reduce construction emissions from future development that could occur as a result of adoption of the Incentive District to a less-than-significant level. Additional feasible measures cannot be developed without knowing the exact timing or location of the construction projects. Because there is no way to accurately predict the intensity of construction associated with the Incentive District or the construction timing, this impact is considered cumulatively significant and unavoidable.

Similarly, there is no way to accurately predict the intensity or timing of construction associated with the entire project and other non-Incentive District projects. As a result, cumulative construction impacts with respect to non-Incentive District projects are also considered cumulatively significant and unavoidable.

Operation of the potential development projects under the Incentive District would result in mobile source emissions generated by vehicle trips from future development and population growth. Operation of the Complete Streets improvements is not expected to result directly in an increase in emissions and would therefore not contribute to cumulative impacts. Per capita operational emissions from development projects under the Incentive District are expected to decline in future years relative to existing conditions, in particular mobile source exhaust pollutants from vehicles (i.e., mobile source VOC, NO_X, and CO emissions), due to improved vehicle emission standards and fuel economy standards that have been adopted by the USEPA and State of California (i.e., emissions standards through vehicle model year 2025). Nonetheless, future development that could occur as a result of adoption of the Incentive District could result in an increase in the total amount of VMT due to increased overall density, which may result in an overall increase in mobile source emissions, despite the improved transportation efficiency and per capita emissions reductions expected from mobile sources meeting increasingly more stringent vehicle emissions standards.

As detailed information regarding individual development projects within the Incentive District is not currently available, it cannot be determined with certainty that **MM Incentive District AIR-2** would reduce impacts to a less-than-significant level. Additional feasible measures beyond the mitigation provided by **MM Incentive District AIR-2** cannot be developed without knowing the exact nature of the proposed developments including but not limited to the types and sizes of the proposed uses and associated trip generation rates. Because there is no way to accurately predict the nature or intensity of development projects under the Incentive District, this impact is considered cumulatively significant and unavoidable.

Similarly, there is no way to accurately predict the intensity of development projects associated with the entire project and other non-Incentive District projects. As a result, cumulative operational impacts with respect to non-Incentive District projects are also considered cumulatively significant and unavoidable.

Greenhouse Gases – Construction and Operations

Cumulative development of the entire project (Complete Streets improvements and the Incentive District) could result in development projects in the aggregate that could result in a net increase in GHG emissions over current emission levels in excess of the County's proposed screening level threshold which is 900 MT of CO_2e per year. Therefore, implementation of the Complete Streets improvements and Incentive District could result in significant GHG emissions. Compliance with current and future Title 24 standards and **MM Incentive District AIR-2** would result in development projects which are more energy efficient than current development, relying on a wide array of strategies such as, possibly, solar water heating and photovoltaic roofs, Energy Star® appliances, etc., resulting a reduction in GHG emissions as compared to current practices. There are no additional feasible mitigation measures available. Thus, even with **MM Incentive District AIR-2**, the net increase in GHG emissions in the aggregate could exceed thresholds, and impacts are considered potentially cumulatively significant and unavoidable.

As the entire project would be considered potentially cumulatively significant and unavoidable, and since GHG impacts are exclusively cumulative in nature, operational impacts with respect to non-Incentive District projects are also considered potentially cumulatively significant and unavoidable.

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Appendix A

Emissions Calculations and Model Output

A-1 Complete Streets Improvements Emissions Calculations and Model Output

Oceanside

Appendix A, Air Quality Worksheets and Greenhouse Gas Emissions Data Worksheets

Construction Emissions

- CalEEMod Output (Summer)
- CalEEMod Output (Winter)
- CalEEMod Output (Annual)

Appendix A, Air Quality Worksheets and Greenhouse Gas Emissions Data Worksheets

Construction Emissions

- CalEEMod Output (Summer)

Oceanside Coast Highway Corridor Study - Construction

San Diego County APCD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	67.00	1000sqft	1.54	67,000.00	0
Other Asphalt Surfaces	67.00	1000sqft	1.54	67,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - See AQ Model Inputs

Off-road Equipment -

Off-road Equipment - See AQ Model Inputs (Assumes 2 roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Trips and VMT - See AQ model inputs (Vendor trip for water trucks)

Grading - See AQ Model Inputs (Assumes 2 Roundabouts)

Vehicle Trips -

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Construction Off-road Equipment Mitigation -

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tblConstructionPhase	NumDaysWeek	5.00	6.00

tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
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tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
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tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	6.00	10.00
tblOffRoadEquipment	UsageHours	7.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	6.00	10.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	22.00	24.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	8.5607	83.1434	61.7056	0.1042	0.7742	4.3689	4.8753	0.2035	4.0270	4.1617	0.0000	10,350.7685	10,350.7685	2.9903	0.0000	10,425.5255
Maximum	**8.5607**	**83.1434**	**61.7056**	**0.1042**	**0.7742**	**4.3689**	**4.8753**	**0.2035**	**4.0270**	**4.1617**	**0.0000**	**10,350.7685**	**10,350.7685**	**2.9903**	**0.0000**	**10,425.5255**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	8.5607	83.1434	61.7056	0.1042	0.7460	4.3689	4.8753	0.1996	4.0270	4.1617	0.0000	10,350.7685	10,350.7685	2.9903	0.0000	10,425.5255
Maximum	**8.5607**	**83.1434**	**61.7056**	**0.1042**	**0.7460**	**4.3689**	**4.8753**	**0.1996**	**4.0270**	**4.1617**	**0.0000**	**10,350.7685**	**10,350.7685**	**2.9903**	**0.0000**	**10,425.5255**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**3.64**	**0.00**	**0.00**	**1.88**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2018	1/15/2018	6	13	
2	Site Preparation	Site Preparation	1/16/2018	1/30/2018	6	13	
3	Grading	Grading	1/31/2018	2/14/2018	6	13	
4	Utility Trenching	Trenching	2/15/2018	3/1/2018	6	13	
5	Building Construction	Building Construction	3/2/2018	3/30/2018	6	25	
6	Paving	Paving	3/31/2018	4/28/2018	6	25	

Acres of Grading (Site Preparation Phase): 0.23

Acres of Grading (Grading Phase): 0.23

Acres of Paving: 3.08

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Utility Trenching	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Paving	Cement and Mortar Mixers	0	6.00	9	0.56
Demolition	Concrete/Industrial Saws	2	10.00	81	0.73
Demolition	Excavators	2	10.00	162	0.38
Building Construction	Cranes	0	7.00	231	0.29
Building Construction	Forklifts	0	8.00	89	0.20
Grading	Excavators	2	10.00	162	0.38
Paving	Pavers	2	10.00	125	0.42
Paving	Rollers	2	10.00	80	0.38
Demolition	Rubber Tired Loaders	2	10.00	199	0.36
Grading	Rubber Tired Dozers	0	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	4	10.00	97	0.37
Building Construction	Generator Sets	0	8.00	84	0.74
Grading	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Paving	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Grading	Graders	0	8.00	187	0.41
Paving	Paving Equipment	4	10.00	130	0.36
Site Preparation	Rubber Tired Loaders	2	10.00	199	0.36
Building Construction	Welders	0	8.00	46	0.45
Demolition	Crushing/Proc. Equipment	2	10.00	85	0.78
Demolition	Signal Boards	4	10.00	6	0.82
Demolition	Tractors/Loaders/Backhoes	2	10.00	97	0.37

Site Preparation	Signal Boards	4	10.00	6	0.82
Site Preparation	Excavators	2	10.00	162	0.38
Grading	Plate Compactors	2	10.00	8	0.43
Grading	Signal Boards	4	10.00	6	0.82
Grading	Rubber Tired Loaders	2	10.00	199	0.36
Utility Trenching	Trenchers	2	10.00	80	0.50
Building Construction	Signal Boards	4	10.00	6	0.82
Building Construction	Excavators	2	10.00	162	0.38
Building Construction	Plate Compactors	2	10.00	8	0.43
Building Construction	Rubber Tired Loaders	2	10.00	199	0.36
Paving	Signal Boards	4	10.00	6	0.82
Paving	Rubber Tired Loaders	2	10.00	199	0.36
Paving	Excavators	2	10.00	162	0.38
Paving	Forklifts	2	10.00	89	0.20
Paving	Graders	2	10.00	174	0.41
Paving	Plate Compactors	2	10.00	8	0.43
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Utility Trenching	4	10.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	14	56.00	24.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	14	35.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	12	30.00	2.00	104.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	24	60.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	10	25.00	2.00	375.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

3.2 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	5.7405	50.4899	40.3072	0.0730		2.8607	2.8607		2.7573	2.7573		7,044.5200	7,044.5200	1.4302		7,080.2742
Total	**5.7405**	**50.4899**	**40.3072**	**0.0730**		**2.8607**	**2.8607**		**2.7573**	**2.7573**		**7,044.5200**	**7,044.5200**	**1.4302**		**7,080.2742**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0103	0.2635	0.0698	5.6000e-004	0.0135	2.0600e-003	0.0156	3.9000e-003	1.9700e-003	5.8700e-003		59.6380	59.6380	4.7300e-003		59.7561
Worker	0.1490	0.1073	1.1981	3.1500e-003	0.2875	2.0700e-003	0.2896	0.0763	1.9100e-003	0.0782		314.0286	314.0286	0.0108		314.2972
Total	**0.1593**	**0.3708**	**1.2679**	**3.7100e-003**	**0.3011**	**4.1300e-003**	**0.3052**	**0.0802**	**3.8800e-003**	**0.0840**		**373.6666**	**373.6666**	**0.0155**		**374.0534**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	5.7405	50.4899	40.3072	0.0730		2.8607	2.8607		2.7573	2.7573	0.0000	7,044.5200	7,044.5200	1.4302		7,080.2742
Total	**5.7405**	**50.4899**	**40.3072**	**0.0730**		**2.8607**	**2.8607**		**2.7573**	**2.7573**	**0.0000**	**7,044.5200**	**7,044.5200**	**1.4302**		**7,080.2742**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0103	0.2635	0.0698	5.6000e-004	0.0135	2.0600e-003	0.0156	3.9000e-003	1.9700e-003	5.8700e-003		59.6380	59.6380	4.7300e-003		59.7561
Worker	0.1490	0.1073	1.1981	3.1500e-003	0.2875	2.0700e-003	0.2896	0.0763	1.9100e-003	0.0782		314.0286	314.0286	0.0108		314.2972
Total	**0.1593**	**0.3708**	**1.2679**	**3.7100e-003**	**0.3011**	**4.1300e-003**	**0.3052**	**0.0802**	**3.8800e-003**	**0.0840**		**373.6666**	**373.6666**	**0.0155**		**374.0534**

3.3 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0512	0.0000	0.0512	6.9400e-003	0.0000	6.9400e-003			0.0000			0.0000
Off-Road	2.7466	29.3570	19.9965	0.0398		1.3631	1.3631		1.2596	1.2596		3,901.5331	3,901.5331	1.1634		3,930.6191
Total	**2.7466**	**29.3570**	**19.9965**	**0.0398**	**0.0512**	**1.3631**	**1.4143**	**6.9400e-003**	**1.2596**	**1.2666**		**3,901.5331**	**3,901.5331**	**1.1634**		**3,930.6191**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2641	9.1752	1.8923	0.0232	0.5041	0.0361	0.5402	0.1381	0.0345	0.1727		2,523.3304	2,523.3304	0.2224		2,528.8912
Vendor	0.0103	0.2635	0.0698	5.6000e-004	0.0135	2.0600e-003	0.0156	3.9000e-003	1.9700e-003	5.8700e-003		59.6380	59.6380	4.7300e-003		59.7561
Worker	0.1064	0.0766	0.8558	2.2500e-003	0.2054	1.4800e-003	0.2069	0.0545	1.3600e-003	0.0558		224.3061	224.3061	7.6800e-003		224.4980
Total	**0.3808**	**9.5153**	**2.8179**	**0.0260**	**0.7230**	**0.0396**	**0.7626**	**0.1965**	**0.0379**	**0.2344**		**2,807.2745**	**2,807.2745**	**0.2348**		**2,813.1454**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0230	0.0000	0.0230	3.1200e-003	0.0000	3.1200e-003			0.0000			0.0000
Off-Road	2.7466	29.3570	19.9965	0.0398		1.3631	1.3631		1.2596	1.2596	0.0000	3,901.5331	3,901.5331	1.1634		3,930.6191
Total	**2.7466**	**29.3570**	**19.9965**	**0.0398**	**0.0230**	**1.3631**	**1.3861**	**3.1200e-003**	**1.2596**	**1.2627**	**0.0000**	**3,901.5331**	**3,901.5331**	**1.1634**		**3,930.6191**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2641	9.1752	1.8923	0.0232	0.5041	0.0361	0.5402	0.1381	0.0345	0.1727		2,523.3304	2,523.3304	0.2224		2,528.8912
Vendor	0.0103	0.2635	0.0698	5.6000e-004	0.0135	2.0600e-003	0.0156	3.9000e-003	1.9700e-003	5.8700e-003		59.6380	59.6380	4.7300e-003		59.7561
Worker	0.1064	0.0766	0.8558	2.2500e-003	0.2054	1.4800e-003	0.2069	0.0545	1.3600e-003	0.0558		224.3061	224.3061	7.6800e-003		224.4980
Total	**0.3808**	**9.5153**	**2.8179**	**0.0260**	**0.7230**	**0.0396**	**0.7626**	**0.1965**	**0.0379**	**0.2344**		**2,807.2745**	**2,807.2745**	**0.2348**		**2,813.1454**

3.4 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0278	0.0000	0.0278	3.3900e-003	0.0000	3.3900e-003			0.0000			0.0000
Off-Road	2.8468	29.9853	20.5228	0.0410		1.3875	1.3875		1.2840	1.2840		3,987.7318	3,987.7318	1.1724		4,017.0414
Total	**2.8468**	**29.9853**	**20.5228**	**0.0410**	**0.0278**	**1.3875**	**1.4153**	**3.3900e-003**	**1.2840**	**1.2874**		**3,987.7318**	**3,987.7318**	**1.1724**		**4,017.0414**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0732	2.5446	0.5248	6.4300e-003	0.1398	0.0100	0.1498	0.0383	9.5800e-003	0.0479		699.8036	699.8036	0.0617		701.3458
Vendor	0.0103	0.2635	0.0698	5.6000e-004	0.0135	2.0600e-003	0.0156	3.9000e-003	1.9700e-003	5.8700e-003		59.6380	59.6380	4.7300e-003		59.7561
Worker	0.1277	0.0920	1.0270	2.7000e-003	0.2464	1.7700e-003	0.2482	0.0654	1.6400e-003	0.0670		269.1674	269.1674	9.2100e-003		269.3976
Total	**0.2112**	**2.9001**	**1.6216**	**9.6900e-003**	**0.3998**	**0.0138**	**0.4136**	**0.1076**	**0.0132**	**0.1208**		**1,028.6090**	**1,028.6090**	**0.0756**		**1,030.4996**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0125	0.0000	0.0125	1.5300e-003	0.0000	1.5300e-003			0.0000			0.0000
Off-Road	2.8468	29.9853	20.5228	0.0410		1.3875	1.3875		1.2840	1.2840	0.0000	3,987.7317	3,987.7317	1.1724		4,017.0414
Total	**2.8468**	**29.9853**	**20.5228**	**0.0410**	**0.0125**	**1.3875**	**1.4000**	**1.5300e-003**	**1.2840**	**1.2856**	**0.0000**	**3,987.7317**	**3,987.7317**	**1.1724**		**4,017.0414**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0732	2.5446	0.5248	6.4300e-003	0.1398	0.0100	0.1498	0.0383	9.5800e-003	0.0479		699.8036	699.8036	0.0617		701.3458
Vendor	0.0103	0.2635	0.0698	5.6000e-004	0.0135	2.0600e-003	0.0156	3.9000e-003	1.9700e-003	5.8700e-003		59.6380	59.6380	4.7300e-003		59.7561
Worker	0.1277	0.0920	1.0270	2.7000e-003	0.2464	1.7700e-003	0.2482	0.0654	1.6400e-003	0.0670		269.1674	269.1674	9.2100e-003		269.3976
Total	**0.2112**	**2.9001**	**1.6216**	**9.6900e-003**	**0.3998**	**0.0138**	**0.4136**	**0.1076**	**0.0132**	**0.1208**		**1,028.6090**	**1,028.6090**	**0.0756**		**1,030.4996**

3.5 Utility Trenching - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8259	17.0071	12.6406	0.0164		1.2594	1.2594		1.1586	1.1586		1,652.7041	1,652.7041	0.5145		1,665.5669
Total	**1.8259**	**17.0071**	**12.6406**	**0.0164**		**1.2594**	**1.2594**		**1.1586**	**1.1586**		**1,652.7041**	**1,652.7041**	**0.5145**		**1,665.5669**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0103	0.2635	0.0698	5.6000e-004	0.0135	2.0600e-003	0.0156	3.9000e-003	1.9700e-003	5.8700e-003		59.6380	59.6380	4.7300e-003		59.7561
Worker	0.0426	0.0307	0.3423	9.0000e-004	0.0822	5.9000e-004	0.0827	0.0218	5.5000e-004	0.0223		89.7225	89.7225	3.0700e-003		89.7992
Total	**0.0529**	**0.2942**	**0.4121**	**1.4600e-003**	**0.0957**	**2.6500e-003**	**0.0983**	**0.0257**	**2.5200e-003**	**0.0282**		**149.3604**	**149.3604**	**7.8000e-003**		**149.5554**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8259	17.0071	12.6406	0.0164		1.2594	1.2594		1.1586	1.1586	0.0000	1,652.7041	1,652.7041	0.5145		1,665.5668
Total	**1.8259**	**17.0071**	**12.6406**	**0.0164**		**1.2594**	**1.2594**		**1.1586**	**1.1586**	**0.0000**	**1,652.7041**	**1,652.7041**	**0.5145**		**1,665.5668**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0103	0.2635	0.0698	5.6000e-004	0.0135	2.0600e-003	0.0156	3.9000e-003	1.9700e-003	5.8700e-003		59.6380	59.6380	4.7300e-003		59.7561
Worker	0.0426	0.0307	0.3423	9.0000e-004	0.0822	5.9000e-004	0.0827	0.0218	5.5000e-004	0.0223		89.7225	89.7225	3.0700e-003		89.7992
Total	**0.0529**	**0.2942**	**0.4121**	**1.4600e-003**	**0.0957**	**2.6500e-003**	**0.0983**	**0.0257**	**2.5200e-003**	**0.0282**		**149.3604**	**149.3604**	**7.8000e-003**		**149.5554**

3.6 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.5121	36.5596	26.3646	0.0488		1.8532	1.8532		1.7125	1.7125		4,769.6716	4,769.6716	1.4158		4,805.0671
Total	**3.5121**	**36.5596**	**26.3646**	**0.0488**		**1.8532**	**1.8532**		**1.7125**	**1.7125**		**4,769.6716**	**4,769.6716**	**1.4158**		**4,805.0671**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1238	3.1621	0.8373	6.6900e-003	0.1625	0.0247	0.1872	0.0468	0.0237	0.0704		715.6557	715.6557	0.0567		717.0737
Worker	0.2384	0.1717	1.9170	5.0500e-003	0.4600	3.3100e-003	0.4633	0.1220	3.0500e-003	0.1251		502.4458	502.4458	0.0172		502.8756
Total	**0.3621**	**3.3338**	**2.7544**	**0.0117**	**0.6225**	**0.0280**	**0.6505**	**0.1688**	**0.0267**	**0.1955**		**1,218.1014**	**1,218.1014**	**0.0739**		**1,219.9493**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.5121	36.5596	26.3646	0.0488		1.8532	1.8532		1.7125	1.7125	0.0000	4,769.6716	4,769.6716	1.4158		4,805.0670
Total	**3.5121**	**36.5596**	**26.3646**	**0.0488**		**1.8532**	**1.8532**		**1.7125**	**1.7125**	**0.0000**	**4,769.6716**	**4,769.6716**	**1.4158**		**4,805.0670**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1238	3.1621	0.8373	6.6900e-003	0.1625	0.0247	0.1872	0.0468	0.0237	0.0704		715.6557	715.6557	0.0567		717.0737
Worker	0.2384	0.1717	1.9170	5.0500e-003	0.4600	3.3100e-003	0.4633	0.1220	3.0500e-003	0.1251		502.4458	502.4458	0.0172		502.8756
Total	**0.3621**	**3.3338**	**2.7544**	**0.0117**	**0.6225**	**0.0280**	**0.6505**	**0.1688**	**0.0267**	**0.1955**		**1,218.1014**	**1,218.1014**	**0.0739**		**1,219.9493**

3.7 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	7.9722	82.6959	59.5819	0.0983		4.3633	4.3633		4.0218	4.0218		9,752.7958	9,752.7958	2.9671		9,826.9741
Paving	0.3228					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**8.2950**	**82.6959**	**59.5819**	**0.0983**		**4.3633**	**4.3633**		**4.0218**	**4.0218**		**9,752.7958**	**9,752.7958**	**2.9671**		**9,826.9741**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0103	0.2635	0.0698	5.6000e-004	0.0135	2.0600e-003	0.0156	3.9000e-003	1.9700e-003	5.8700e-003		59.6380	59.6380	4.7300e-003		59.7561
Worker	0.2554	0.1839	2.0540	5.4100e-003	0.4929	3.5500e-003	0.4964	0.1307	3.2700e-003	0.1340		538.3347	538.3347	0.0184		538.7953
Total	**0.2657**	**0.4474**	**2.1237**	**5.9700e-003**	**0.5064**	**5.6100e-003**	**0.5120**	**0.1346**	**5.2400e-003**	**0.1399**		**597.9727**	**597.9727**	**0.0232**		**598.5514**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	7.9722	82.6959	59.5819	0.0983		4.3633	4.3633		4.0218	4.0218	0.0000	9,752.7958	9,752.7958	2.9671		9,826.9741
Paving	0.3228					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**8.2950**	**82.6959**	**59.5819**	**0.0983**		**4.3633**	**4.3633**		**4.0218**	**4.0218**	**0.0000**	**9,752.7958**	**9,752.7958**	**2.9671**		**9,826.9741**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0103	0.2635	0.0698	5.6000e-004	0.0135	2.0600e-003	0.0156	3.9000e-003	1.9700e-003	5.8700e-003		59.6380	59.6380	4.7300e-003		59.7561
Worker	0.2554	0.1839	2.0540	5.4100e-003	0.4929	3.5500e-003	0.4964	0.1307	3.2700e-003	0.1340		538.3347	538.3347	0.0184		538.7953
Total	**0.2657**	**0.4474**	**2.1237**	**5.9700e-003**	**0.5064**	**5.6100e-003**	**0.5120**	**0.1346**	**5.2400e-003**	**0.1399**		**597.9727**	**597.9727**	**0.0232**		**598.5514**

Appendix A, Air Quality Worksheets and Greenhouse Gas Emissions Data Worksheets

Construction Emissions

- CalEEMod Output (Winter)

Oceanside Coast Highway Corridor Study - Construction

San Diego County APCD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	67.00	1000sqft	1.54	67,000.00	0
Other Asphalt Surfaces	67.00	1000sqft	1.54	67,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - See AQ Model Inputs

Off-road Equipment -

Off-road Equipment - See AQ Model Inputs (Assumes 2 roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Trips and VMT - See AQ model inputs (Vendor trip for water trucks)

Grading - See AQ Model Inputs (Assumes 2 Roundabouts)

Vehicle Trips -

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	230.00	25.00
tblConstructionPhase	NumDays	20.00	13.00
tblConstructionPhase	NumDays	8.00	13.00
tblConstructionPhase	NumDays	18.00	25.00
tblConstructionPhase	NumDays	5.00	13.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00

tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	PhaseEndDate	12/31/2017	3/1/2018
tblConstructionPhase	PhaseEndDate	12/31/2017	3/30/2018
tblConstructionPhase	PhaseEndDate	12/31/2017	1/15/2018
tblConstructionPhase	PhaseEndDate	12/31/2017	2/14/2018
tblConstructionPhase	PhaseEndDate	12/31/2017	4/28/2018
tblConstructionPhase	PhaseEndDate	12/31/2017	1/30/2018
tblConstructionPhase	PhaseStartDate	1/1/2018	2/15/2018
tblConstructionPhase	PhaseStartDate	1/1/2018	3/2/2018
tblConstructionPhase	PhaseStartDate	1/1/2018	1/31/2018
tblConstructionPhase	PhaseStartDate	1/1/2018	3/31/2018
tblConstructionPhase	PhaseStartDate	1/1/2018	1/16/2018
tblGrading	AcresOfGrading	0.00	0.23
tblGrading	AcresOfGrading	0.00	0.23
tblGrading	MaterialExported	0.00	3,000.00
tblGrading	MaterialImported	0.00	833.00
tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	130.00	125.00
tblOffRoadEquipment	HorsePower	203.00	199.00
tblOffRoadEquipment	HorsePower	132.00	130.00
tblOffRoadEquipment	HorsePower	203.00	199.00
tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	203.00	199.00
tblOffRoadEquipment	HorsePower	78.00	80.00

tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	203.00	199.00
tblOffRoadEquipment	HorsePower	203.00	199.00
tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	187.00	174.00
tblOffRoadEquipment	OffRoadEquipmentType	Air Compressors	Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType	Rubber Tired Dozers	Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType	Rubber Tired Dozers	Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Crushing/Proc. Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Signal Boards
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Signal Boards
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Signal Boards
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Signal Boards
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Signal Boards
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Forklifts
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00

tblOffRoadEquipment	UsageHours	6.00	10.00
tblOffRoadEquipment	UsageHours	7.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	6.00	10.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	22.00	24.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	8.5942	83.1665	61.6074	0.1039	0.7742	4.3690	4.8754	0.2035	4.0271	4.1617	0.0000	10,316.3318	10,316.3318	2.9897	0.0000	10,391.0737
Maximum	**8.5942**	**83.1665**	**61.6074**	**0.1039**	**0.7742**	**4.3690**	**4.8754**	**0.2035**	**4.0271**	**4.1617**	**0.0000**	**10,316.3318**	**10,316.3318**	**2.9897**	**0.0000**	**10,391.0737**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2018	8.5942	83.1665	61.6074	0.1039	0.7460	4.3690	4.8754	0.1996	4.0271	4.1617	0.0000	10,316.3318	10,316.3318	2.9897	0.0000	10,391.0737
Maximum	**8.5942**	**83.1665**	**61.6074**	**0.1039**	**0.7460**	**4.3690**	**4.8754**	**0.1996**	**4.0271**	**4.1617**	**0.0000**	**10,316.3318**	**10,316.3318**	**2.9897**	**0.0000**	**10,391.0737**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**3.64**	**0.00**	**0.00**	**1.88**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2018	1/15/2018	6	13	
2	Site Preparation	Site Preparation	1/16/2018	1/30/2018	6	13	
3	Grading	Grading	1/31/2018	2/14/2018	6	13	
4	Utility Trenching	Trenching	2/15/2018	3/1/2018	6	13	
5	Building Construction	Building Construction	3/2/2018	3/30/2018	6	25	
6	Paving	Paving	3/31/2018	4/28/2018	6	25	

Acres of Grading (Site Preparation Phase): 0.23

Acres of Grading (Grading Phase): 0.23

Acres of Paving: 3.08

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Utility Trenching	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Paving	Cement and Mortar Mixers	0	6.00	9	0.56
Demolition	Concrete/Industrial Saws	2	10.00	81	0.73
Demolition	Excavators	2	10.00	162	0.38
Building Construction	Cranes	0	7.00	231	0.29
Building Construction	Forklifts	0	8.00	89	0.20
Grading	Excavators	2	10.00	162	0.38
Paving	Pavers	2	10.00	125	0.42
Paving	Rollers	2	10.00	80	0.38
Demolition	Rubber Tired Loaders	2	10.00	199	0.36
Grading	Rubber Tired Dozers	0	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	4	10.00	97	0.37
Building Construction	Generator Sets	0	8.00	84	0.74
Grading	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Paving	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Grading	Graders	0	8.00	187	0.41
Paving	Paving Equipment	4	10.00	130	0.36
Site Preparation	Rubber Tired Loaders	2	10.00	199	0.36
Building Construction	Welders	0	8.00	46	0.45
Demolition	Crushing/Proc. Equipment	2	10.00	85	0.78
Demolition	Signal Boards	4	10.00	6	0.82
Demolition	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Site Preparation	Signal Boards	4	10.00	6	0.82
Site Preparation	Excavators	2	10.00	162	0.38
Grading	Plate Compactors	2	10.00	8	0.43

Grading	Signal Boards	4	10.00	6	0.82
Grading	Rubber Tired Loaders	2	10.00	199	0.36
Utility Trenching	Trenchers	2	10.00	80	0.50
Building Construction	Signal Boards	4	10.00	6	0.82
Building Construction	Excavators	2	10.00	162	0.38
Building Construction	Plate Compactors	2	10.00	8	0.43
Building Construction	Rubber Tired Loaders	2	10.00	199	0.36
Paving	Signal Boards	4	10.00	6	0.82
Paving	Rubber Tired Loaders	2	10.00	199	0.36
Paving	Excavators	2	10.00	162	0.38
Paving	Forklifts	2	10.00	89	0.20
Paving	Graders	2	10.00	174	0.41
Paving	Plate Compactors	2	10.00	8	0.43
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Utility Trenching	4	10.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	14	56.00	24.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	14	35.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	12	30.00	2.00	104.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	24	60.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	10	25.00	2.00	375.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

3.2 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	5.7405	50.4899	40.3072	0.0730		2.8607	2.8607		2.7573	2.7573		7,044.5200	7,044.5200	1.4302		7,080.2742
Total	**5.7405**	**50.4899**	**40.3072**	**0.0730**		**2.8607**	**2.8607**		**2.7573**	**2.7573**		**7,044.5200**	**7,044.5200**	**1.4302**		**7,080.2742**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0108	0.2640	0.0772	5.4000e-004	0.0135	2.1000e-003	0.0156	3.9000e-003	2.0000e-003	5.9000e-003		58.1396	58.1396	5.0300e-003		58.2654
Worker	0.1683	0.1205	1.1365	2.9600e-003	0.2875	2.0700e-003	0.2896	0.0763	1.9100e-003	0.0782		294.8146	294.8146	0.0102		295.0700
Total	**0.1790**	**0.3845**	**1.2137**	**3.5000e-003**	**0.3011**	**4.1700e-003**	**0.3052**	**0.0802**	**3.9100e-003**	**0.0841**		**352.9541**	**352.9541**	**0.0153**		**353.3353**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	5.7405	50.4899	40.3072	0.0730		2.8607	2.8607		2.7573	2.7573	0.0000	7,044.5200	7,044.5200	1.4302		7,080.2742
Total	**5.7405**	**50.4899**	**40.3072**	**0.0730**		**2.8607**	**2.8607**		**2.7573**	**2.7573**	**0.0000**	**7,044.5200**	**7,044.5200**	**1.4302**		**7,080.2742**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0108	0.2640	0.0772	5.4000e-004	0.0135	2.1000e-003	0.0156	3.9000e-003	2.0000e-003	5.9000e-003		58.1396	58.1396	5.0300e-003		58.2654
Worker	0.1683	0.1205	1.1365	2.9600e-003	0.2875	2.0700e-003	0.2896	0.0763	1.9100e-003	0.0782		294.8146	294.8146	0.0102		295.0700
Total	**0.1790**	**0.3845**	**1.2137**	**3.5000e-003**	**0.3011**	**4.1700e-003**	**0.3052**	**0.0802**	**3.9100e-003**	**0.0841**		**352.9541**	**352.9541**	**0.0153**		**353.3353**

3.3 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0512	0.0000	0.0512	6.9400e-003	0.0000	6.9400e-003			0.0000			0.0000
Off-Road	2.7466	29.3570	19.9965	0.0398		1.3631	1.3631		1.2596	1.2596		3,901.5331	3,901.5331	1.1634		3,930.6191
Total	**2.7466**	**29.3570**	**19.9965**	**0.0398**	**0.0512**	**1.3631**	**1.4143**	**6.9400e-003**	**1.2596**	**1.2666**		**3,901.5331**	**3,901.5331**	**1.1634**		**3,930.6191**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2716	9.2733	2.0346	0.0228	0.5041	0.0369	0.5410	0.1381	0.0353	0.1735		2,481.4580	2,481.4580	0.2308		2,487.2271
Vendor	0.0108	0.2640	0.0772	5.4000e-004	0.0135	2.1000e-003	0.0156	3.9000e-003	2.0000e-003	5.9000e-003		58.1396	58.1396	5.0300e-003		58.2654
Worker	0.1202	0.0861	0.8118	2.1200e-003	0.2054	1.4800e-003	0.2069	0.0545	1.3600e-003	0.0558		210.5818	210.5818	7.3000e-003		210.7643
Total	**0.4026**	**9.6234**	**2.9236**	**0.0255**	**0.7230**	**0.0405**	**0.7635**	**0.1965**	**0.0387**	**0.2352**		**2,750.1794**	**2,750.1794**	**0.2431**		**2,756.2568**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0230	0.0000	0.0230	3.1200e-003	0.0000	3.1200e-003			0.0000			0.0000
Off-Road	2.7466	29.3570	19.9965	0.0398		1.3631	1.3631		1.2596	1.2596	0.0000	3,901.5331	3,901.5331	1.1634		3,930.6191
Total	**2.7466**	**29.3570**	**19.9965**	**0.0398**	**0.0230**	**1.3631**	**1.3861**	**3.1200e-003**	**1.2596**	**1.2627**	**0.0000**	**3,901.5331**	**3,901.5331**	**1.1634**		**3,930.6191**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2716	9.2733	2.0346	0.0228	0.5041	0.0369	0.5410	0.1381	0.0353	0.1735		2,481.4580	2,481.4580	0.2308		2,487.2271
Vendor	0.0108	0.2640	0.0772	5.4000e-004	0.0135	2.1000e-003	0.0156	3.9000e-003	2.0000e-003	5.9000e-003		58.1396	58.1396	5.0300e-003		58.2654
Worker	0.1202	0.0861	0.8118	2.1200e-003	0.2054	1.4800e-003	0.2069	0.0545	1.3600e-003	0.0558		210.5818	210.5818	7.3000e-003		210.7643
Total	**0.4026**	**9.6234**	**2.9236**	**0.0255**	**0.7230**	**0.0405**	**0.7635**	**0.1965**	**0.0387**	**0.2352**		**2,750.1794**	**2,750.1794**	**0.2431**		**2,756.2568**

3.4 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0278	0.0000	0.0278	3.3900e-003	0.0000	3.3900e-003			0.0000			0.0000
Off-Road	2.8468	29.9853	20.5228	0.0410		1.3875	1.3875		1.2840	1.2840		3,987.7318	3,987.7318	1.1724		4,017.0414
Total	**2.8468**	**29.9853**	**20.5228**	**0.0410**	**0.0278**	**1.3875**	**1.4153**	**3.3900e-003**	**1.2840**	**1.2874**		**3,987.7318**	**3,987.7318**	**1.1724**		**4,017.0414**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0753	2.5718	0.5643	6.3300e-003	0.1398	0.0103	0.1500	0.0383	9.8000e-003	0.0481		688.1910	688.1910	0.0640		689.7910
Vendor	0.0108	0.2640	0.0772	5.4000e-004	0.0135	2.1000e-003	0.0156	3.9000e-003	2.0000e-003	5.9000e-003		58.1396	58.1396	5.0300e-003		58.2654
Worker	0.1443	0.1033	0.9742	2.5400e-003	0.2464	1.7700e-003	0.2482	0.0654	1.6400e-003	0.0670		252.6982	252.6982	8.7600e-003		252.9171
Total	**0.2303**	**2.9390**	**1.6156**	**9.4100e-003**	**0.3998**	**0.0141**	**0.4139**	**0.1076**	**0.0134**	**0.1210**		**999.0288**	**999.0288**	**0.0778**		**1,000.9735**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0125	0.0000	0.0125	1.5300e-003	0.0000	1.5300e-003			0.0000			0.0000
Off-Road	2.8468	29.9853	20.5228	0.0410		1.3875	1.3875		1.2840	1.2840	0.0000	3,987.7317	3,987.7317	1.1724		4,017.0414
Total	**2.8468**	**29.9853**	**20.5228**	**0.0410**	**0.0125**	**1.3875**	**1.4000**	**1.5300e-003**	**1.2840**	**1.2856**	**0.0000**	**3,987.7317**	**3,987.7317**	**1.1724**		**4,017.0414**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0753	2.5718	0.5643	6.3300e-003	0.1398	0.0103	0.1500	0.0383	9.8000e-003	0.0481		688.1910	688.1910	0.0640		689.7910
Vendor	0.0108	0.2640	0.0772	5.4000e-004	0.0135	2.1000e-003	0.0156	3.9000e-003	2.0000e-003	5.9000e-003		58.1396	58.1396	5.0300e-003		58.2654
Worker	0.1443	0.1033	0.9742	2.5400e-003	0.2464	1.7700e-003	0.2482	0.0654	1.6400e-003	0.0670		252.6982	252.6982	8.7600e-003		252.9171
Total	**0.2303**	**2.9390**	**1.6156**	**9.4100e-003**	**0.3998**	**0.0141**	**0.4139**	**0.1076**	**0.0134**	**0.1210**		**999.0288**	**999.0288**	**0.0778**		**1,000.9735**

3.5 Utility Trenching - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8259	17.0071	12.6406	0.0164		1.2594	1.2594		1.1586	1.1586		1,652.7041	1,652.7041	0.5145		1,665.5669
Total	**1.8259**	**17.0071**	**12.6406**	**0.0164**		**1.2594**	**1.2594**		**1.1586**	**1.1586**		**1,652.7041**	**1,652.7041**	**0.5145**		**1,665.5669**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0108	0.2640	0.0772	5.4000e-004	0.0135	2.1000e-003	0.0156	3.9000e-003	2.0000e-003	5.9000e-003		58.1396	58.1396	5.0300e-003		58.2654
Worker	0.0481	0.0344	0.3247	8.5000e-004	0.0822	5.9000e-004	0.0827	0.0218	5.5000e-004	0.0223		84.2327	84.2327	2.9200e-003		84.3057
Total	**0.0588**	**0.2984**	**0.4019**	**1.3900e-003**	**0.0957**	**2.6900e-003**	**0.0984**	**0.0257**	**2.5500e-003**	**0.0282**		**142.3723**	**142.3723**	**7.9500e-003**		**142.5711**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.8259	17.0071	12.6406	0.0164		1.2594	1.2594		1.1586	1.1586	0.0000	1,652.7041	1,652.7041	0.5145		1,665.5668
Total	**1.8259**	**17.0071**	**12.6406**	**0.0164**		**1.2594**	**1.2594**		**1.1586**	**1.1586**	**0.0000**	**1,652.7041**	**1,652.7041**	**0.5145**		**1,665.5668**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0108	0.2640	0.0772	5.4000e-004	0.0135	2.1000e-003	0.0156	3.9000e-003	2.0000e-003	5.9000e-003		58.1396	58.1396	5.0300e-003		58.2654
Worker	0.0481	0.0344	0.3247	8.5000e-004	0.0822	5.9000e-004	0.0827	0.0218	5.5000e-004	0.0223		84.2327	84.2327	2.9200e-003		84.3057
Total	**0.0588**	**0.2984**	**0.4019**	**1.3900e-003**	**0.0957**	**2.6900e-003**	**0.0984**	**0.0257**	**2.5500e-003**	**0.0282**		**142.3723**	**142.3723**	**7.9500e-003**		**142.5711**

3.6 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.5121	36.5596	26.3646	0.0488		1.8532	1.8532		1.7125	1.7125		4,769.6716	4,769.6716	1.4158		4,805.0671
Total	**3.5121**	**36.5596**	**26.3646**	**0.0488**		**1.8532**	**1.8532**		**1.7125**	**1.7125**		**4,769.6716**	**4,769.6716**	**1.4158**		**4,805.0671**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1290	3.1675	0.9264	6.5200e-003	0.1625	0.0251	0.1876	0.0468	0.0241	0.0708		697.6751	697.6751	0.0604		699.1843
Worker	0.2693	0.1928	1.8185	4.7400e-003	0.4600	3.3100e-003	0.4633	0.1220	3.0500e-003	0.1251		471.7033	471.7033	0.0164		472.1119
Total	**0.3983**	**3.3603**	**2.7449**	**0.0113**	**0.6225**	**0.0285**	**0.6510**	**0.1688**	**0.0271**	**0.1959**		**1,169.3783**	**1,169.3783**	**0.0767**		**1,171.2963**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.5121	36.5596	26.3646	0.0488		1.8532	1.8532		1.7125	1.7125	0.0000	4,769.6716	4,769.6716	1.4158		4,805.0670
Total	**3.5121**	**36.5596**	**26.3646**	**0.0488**		**1.8532**	**1.8532**		**1.7125**	**1.7125**	**0.0000**	**4,769.6716**	**4,769.6716**	**1.4158**		**4,805.0670**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1290	3.1675	0.9264	6.5200e-003	0.1625	0.0251	0.1876	0.0468	0.0241	0.0708		697.6751	697.6751	0.0604		699.1843
Worker	0.2693	0.1928	1.8185	4.7400e-003	0.4600	3.3100e-003	0.4633	0.1220	3.0500e-003	0.1251		471.7033	471.7033	0.0164		472.1119
Total	**0.3983**	**3.3603**	**2.7449**	**0.0113**	**0.6225**	**0.0285**	**0.6510**	**0.1688**	**0.0271**	**0.1959**		**1,169.3783**	**1,169.3783**	**0.0767**		**1,171.2963**

3.7 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	7.9722	82.6959	59.5819	0.0983		4.3633	4.3633		4.0218	4.0218		9,752.7958	9,752.7958	2.9671		9,826.9741
Paving	0.3228					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**8.2950**	**82.6959**	**59.5819**	**0.0983**		**4.3633**	**4.3633**		**4.0218**	**4.0218**		**9,752.7958**	**9,752.7958**	**2.9671**		**9,826.9741**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0108	0.2640	0.0772	5.4000e-004	0.0135	2.1000e-003	0.0156	3.9000e-003	2.0000e-003	5.9000e-003		58.1396	58.1396	5.0300e-003		58.2654
Worker	0.2885	0.2066	1.9484	5.0800e-003	0.4929	3.5500e-003	0.4964	0.1307	3.2700e-003	0.1340		505.3964	505.3964	0.0175		505.8342
Total	**0.2992**	**0.4705**	**2.0256**	**5.6200e-003**	**0.5064**	**5.6500e-003**	**0.5121**	**0.1346**	**5.2700e-003**	**0.1399**		**563.5360**	**563.5360**	**0.0225**		**564.0996**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	7.9722	82.6959	59.5819	0.0983		4.3633	4.3633		4.0218	4.0218	0.0000	9,752.7958	9,752.7958	2.9671		9,826.9741
Paving	0.3228					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**8.2950**	**82.6959**	**59.5819**	**0.0983**		**4.3633**	**4.3633**		**4.0218**	**4.0218**	**0.0000**	**9,752.7958**	**9,752.7958**	**2.9671**		**9,826.9741**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0108	0.2640	0.0772	5.4000e-004	0.0135	2.1000e-003	0.0156	3.9000e-003	2.0000e-003	5.9000e-003		58.1396	58.1396	5.0300e-003		58.2654
Worker	0.2885	0.2066	1.9484	5.0800e-003	0.4929	3.5500e-003	0.4964	0.1307	3.2700e-003	0.1340		505.3964	505.3964	0.0175		505.8342
Total	**0.2992**	**0.4705**	**2.0256**	**5.6200e-003**	**0.5064**	**5.6500e-003**	**0.5121**	**0.1346**	**5.2700e-003**	**0.1399**		**563.5360**	**563.5360**	**0.0225**		**564.0996**

Appendix A, Air Quality Worksheets and Greenhouse Gas Emissions Data Worksheets

Construction Emissions

- CalEEMod Output (Annual)

Oceanside Coast Highway Corridor Study - Construction

San Diego County APCD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	67.00	1000sqft	1.54	67,000.00	0
Other Asphalt Surfaces	67.00	1000sqft	1.54	67,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - See AQ Model Inputs

Off-road Equipment -

Off-road Equipment - See AQ Model Inputs (Assumes 2 roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Off-road Equipment - See AQ Model Inputs (Assumes 2 Roundabouts)

Trips and VMT - See AQ model inputs (Vendor trip for water trucks)

Grading - See AQ Model Inputs (Assumes 2 Roundabouts)

Vehicle Trips -

Vehicle Emission Factors -

Vehicle Emission Factors -

Vehicle Emission Factors -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	230.00	25.00
tblConstructionPhase	NumDays	20.00	13.00
tblConstructionPhase	NumDays	8.00	13.00
tblConstructionPhase	NumDays	18.00	25.00
tblConstructionPhase	NumDays	5.00	13.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	NumDaysWeek	5.00	6.00
tblConstructionPhase	PhaseEndDate	12/31/2017	3/1/2018
tblConstructionPhase	PhaseEndDate	12/31/2017	3/30/2018
tblConstructionPhase	PhaseEndDate	12/31/2017	1/15/2018
tblConstructionPhase	PhaseEndDate	12/31/2017	2/14/2018
tblConstructionPhase	PhaseEndDate	12/31/2017	4/28/2018
tblConstructionPhase	PhaseEndDate	12/31/2017	1/30/2018
tblConstructionPhase	PhaseStartDate	1/1/2018	2/15/2018
tblConstructionPhase	PhaseStartDate	1/1/2018	3/2/2018
tblConstructionPhase	PhaseStartDate	1/1/2018	1/31/2018

tblConstructionPhase	PhaseStartDate	1/1/2018	3/31/2018
tblConstructionPhase	PhaseStartDate	1/1/2018	1/16/2018
tblGrading	AcresOfGrading	0.00	0.23
tblGrading	AcresOfGrading	0.00	0.23
tblGrading	MaterialExported	0.00	3,000.00
tblGrading	MaterialImported	0.00	833.00
tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	130.00	125.00
tblOffRoadEquipment	HorsePower	203.00	199.00
tblOffRoadEquipment	HorsePower	132.00	130.00
tblOffRoadEquipment	HorsePower	203.00	199.00
tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	203.00	199.00
tblOffRoadEquipment	HorsePower	78.00	80.00
tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	203.00	199.00
tblOffRoadEquipment	HorsePower	203.00	199.00
tblOffRoadEquipment	HorsePower	158.00	162.00
tblOffRoadEquipment	HorsePower	187.00	174.00
tblOffRoadEquipment	OffRoadEquipmentType	Air Compressors	Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType	Rubber Tired Dozers	Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType	Rubber Tired Dozers	Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Crushing/Proc. Equipment

tblOffRoadEquipment	OffRoadEquipmentType		Signal Boards
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Signal Boards
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Signal Boards
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Trenchers
tblOffRoadEquipment	OffRoadEquipmentType		Signal Boards
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Signal Boards
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Forklifts
tblOffRoadEquipment	OffRoadEquipmentType		Graders
tblOffRoadEquipment	OffRoadEquipmentType		Plate Compactors
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	4.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
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tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	8.00	10.00
tblOffRoadEquipment	UsageHours	6.00	10.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	22.00	24.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.2463	2.4503	1.7801	3.4200e-003	0.0240	0.1232	0.1471	6.3900e-003	0.1144	0.1208	0.0000	307.6590	307.6590	0.0780	0.0000	309.6099
Maximum	**0.2463**	**2.4503**	**1.7801**	**3.4200e-003**	**0.0240**	**0.1232**	**0.1471**	**6.3900e-003**	**0.1144**	**0.1208**	**0.0000**	**307.6590**	**307.6590**	**0.0780**	**0.0000**	**309.6099**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.2463	2.4503	1.7801	3.4200e-003	0.0237	0.1232	0.1469	6.3500e-003	0.1144	0.1208	0.0000	307.6587	307.6587	0.0780	0.0000	309.6096
Maximum	**0.2463**	**2.4503**	**1.7801**	**3.4200e-003**	**0.0237**	**0.1232**	**0.1469**	**6.3500e-003**	**0.1144**	**0.1208**	**0.0000**	**307.6587**	**307.6587**	**0.0780**	**0.0000**	**309.6096**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**1.17**	**0.00**	**0.19**	**0.63**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2018	1/15/2018	6	13	
2	Site Preparation	Site Preparation	1/16/2018	1/30/2018	6	13	
3	Grading	Grading	1/31/2018	2/14/2018	6	13	
4	Utility Trenching	Trenching	2/15/2018	3/1/2018	6	13	
5	Building Construction	Building Construction	3/2/2018	3/30/2018	6	25	
6	Paving	Paving	3/31/2018	4/28/2018	6	25	

Acres of Grading (Site Preparation Phase): 0.23

Acres of Grading (Grading Phase): 0.23

Acres of Paving: 3.08

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Utility Trenching	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Paving	Cement and Mortar Mixers	0	6.00	9	0.56
Demolition	Concrete/Industrial Saws	2	10.00	81	0.73
Demolition	Excavators	2	10.00	162	0.38
Building Construction	Cranes	0	7.00	231	0.29
Building Construction	Forklifts	0	8.00	89	0.20
Grading	Excavators	2	10.00	162	0.38
Paving	Pavers	2	10.00	125	0.42
Paving	Rollers	2	10.00	80	0.38
Demolition	Rubber Tired Loaders	2	10.00	199	0.36
Grading	Rubber Tired Dozers	0	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	4	10.00	97	0.37
Building Construction	Generator Sets	0	8.00	84	0.74
Grading	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Paving	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Grading	Graders	0	8.00	187	0.41
Paving	Paving Equipment	4	10.00	130	0.36
Site Preparation	Rubber Tired Loaders	2	10.00	199	0.36

Building Construction	Welders	0	8.00	46	0.45
Demolition	Crushing/Proc. Equipment	2	10.00	85	0.78
Demolition	Signal Boards	4	10.00	6	0.82
Demolition	Tractors/Loaders/Backhoes	2	10.00	97	0.37
Site Preparation	Signal Boards	4	10.00	6	0.82
Site Preparation	Excavators	2	10.00	162	0.38
Grading	Plate Compactors	2	10.00	8	0.43
Grading	Signal Boards	4	10.00	6	0.82
Grading	Rubber Tired Loaders	2	10.00	199	0.36
Utility Trenching	Trenchers	2	10.00	80	0.50
Building Construction	Signal Boards	4	10.00	6	0.82
Building Construction	Excavators	2	10.00	162	0.38
Building Construction	Plate Compactors	2	10.00	8	0.43
Building Construction	Rubber Tired Loaders	2	10.00	199	0.36
Paving	Signal Boards	4	10.00	6	0.82
Paving	Rubber Tired Loaders	2	10.00	199	0.36
Paving	Excavators	2	10.00	162	0.38
Paving	Forklifts	2	10.00	89	0.20
Paving	Graders	2	10.00	174	0.41
Paving	Plate Compactors	2	10.00	8	0.43
Demolition	Rubber Tired Dozers	0	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Utility Trenching	4	10.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	14	56.00	24.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	14	35.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	12	30.00	2.00	104.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	24	60.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	10	25.00	2.00	375.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

3.2 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0373	0.3282	0.2620	4.7000e-004		0.0186	0.0186		0.0179	0.0179	0.0000	41.5394	41.5394	8.4300e-003	0.0000	41.7503
Total	**0.0373**	**0.3282**	**0.2620**	**4.7000e-004**		**0.0186**	**0.0186**		**0.0179**	**0.0179**	**0.0000**	**41.5394**	**41.5394**	**8.4300e-003**	**0.0000**	**41.7503**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.0000e-005	1.7400e-003	4.8000e-004	0.0000	9.0000e-005	1.0000e-005	1.0000e-004	2.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.3480	0.3480	3.0000e-005	0.0000	0.3487
Worker	9.7000e-004	7.7000e-004	7.3800e-003	2.0000e-005	1.8200e-003	1.0000e-005	1.8400e-003	4.8000e-004	1.0000e-005	5.0000e-004	0.0000	1.7558	1.7558	6.0000e-005	0.0000	1.7573
Total	**1.0400e-003**	**2.5100e-003**	**7.8600e-003**	**2.0000e-005**	**1.9100e-003**	**2.0000e-005**	**1.9400e-003**	**5.0000e-004**	**2.0000e-005**	**5.4000e-004**	**0.0000**	**2.1038**	**2.1038**	**9.0000e-005**	**0.0000**	**2.1060**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0373	0.3282	0.2620	4.7000e-004		0.0186	0.0186		0.0179	0.0179	0.0000	41.5394	41.5394	8.4300e-003	0.0000	41.7502
Total	**0.0373**	**0.3282**	**0.2620**	**4.7000e-004**		**0.0186**	**0.0186**		**0.0179**	**0.0179**	**0.0000**	**41.5394**	**41.5394**	**8.4300e-003**	**0.0000**	**41.7502**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.0000e-005	1.7400e-003	4.8000e-004	0.0000	9.0000e-005	1.0000e-005	1.0000e-004	2.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.3480	0.3480	3.0000e-005	0.0000	0.3487
Worker	9.7000e-004	7.7000e-004	7.3800e-003	2.0000e-005	1.8200e-003	1.0000e-005	1.8400e-003	4.8000e-004	1.0000e-005	5.0000e-004	0.0000	1.7558	1.7558	6.0000e-005	0.0000	1.7573
Total	**1.0400e-003**	**2.5100e-003**	**7.8600e-003**	**2.0000e-005**	**1.9100e-003**	**2.0000e-005**	**1.9400e-003**	**5.0000e-004**	**2.0000e-005**	**5.4000e-004**	**0.0000**	**2.1038**	**2.1038**	**9.0000e-005**	**0.0000**	**2.1060**

3.3 Site Preparation - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.3000e-004	0.0000	3.3000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0179	0.1908	0.1300	2.6000e-004		8.8600e-003	8.8600e-003		8.1900e-003	8.1900e-003	0.0000	23.0062	23.0062	6.8600e-003	0.0000	23.1777
Total	**0.0179**	**0.1908**	**0.1300**	**2.6000e-004**	**3.3000e-004**	**8.8600e-003**	**9.1900e-003**	**5.0000e-005**	**8.1900e-003**	**8.2400e-003**	**0.0000**	**23.0062**	**23.0062**	**6.8600e-003**	**0.0000**	**23.1777**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7400e-003	0.0609	0.0127	1.5000e-004	3.2100e-003	2.4000e-004	3.4500e-003	8.8000e-004	2.3000e-004	1.1100e-003	0.0000	14.7756	14.7756	1.3300e-003	0.0000	14.8090
Vendor	7.0000e-005	1.7400e-003	4.8000e-004	0.0000	9.0000e-005	1.0000e-005	1.0000e-004	2.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.3480	0.3480	3.0000e-005	0.0000	0.3487
Worker	6.9000e-004	5.5000e-004	5.2700e-003	1.0000e-005	1.3000e-003	1.0000e-005	1.3100e-003	3.5000e-004	1.0000e-005	3.6000e-004	0.0000	1.2541	1.2541	4.0000e-005	0.0000	1.2552
Total	**2.5000e-003**	**0.0632**	**0.0185**	**1.6000e-004**	**4.6000e-003**	**2.6000e-004**	**4.8600e-003**	**1.2500e-003**	**2.5000e-004**	**1.5100e-003**	**0.0000**	**16.3777**	**16.3777**	**1.4000e-003**	**0.0000**	**16.4128**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.5000e-004	0.0000	1.5000e-004	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0179	0.1908	0.1300	2.6000e-004		8.8600e-003	8.8600e-003		8.1900e-003	8.1900e-003	0.0000	23.0062	23.0062	6.8600e-003	0.0000	23.1777
Total	**0.0179**	**0.1908**	**0.1300**	**2.6000e-004**	**1.5000e-004**	**8.8600e-003**	**9.0100e-003**	**2.0000e-005**	**8.1900e-003**	**8.2100e-003**	**0.0000**	**23.0062**	**23.0062**	**6.8600e-003**	**0.0000**	**23.1777**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7400e-003	0.0609	0.0127	1.5000e-004	3.2100e-003	2.4000e-004	3.4500e-003	8.8000e-004	2.3000e-004	1.1100e-003	0.0000	14.7756	14.7756	1.3300e-003	0.0000	14.8090
Vendor	7.0000e-005	1.7400e-003	4.8000e-004	0.0000	9.0000e-005	1.0000e-005	1.0000e-004	2.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.3480	0.3480	3.0000e-005	0.0000	0.3487
Worker	6.9000e-004	5.5000e-004	5.2700e-003	1.0000e-005	1.3000e-003	1.0000e-005	1.3100e-003	3.5000e-004	1.0000e-005	3.6000e-004	0.0000	1.2541	1.2541	4.0000e-005	0.0000	1.2552
Total	**2.5000e-003**	**0.0632**	**0.0185**	**1.6000e-004**	**4.6000e-003**	**2.6000e-004**	**4.8600e-003**	**1.2500e-003**	**2.5000e-004**	**1.5100e-003**	**0.0000**	**16.3777**	**16.3777**	**1.4000e-003**	**0.0000**	**16.4128**

3.4 Grading - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.8000e-004	0.0000	1.8000e-004	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0185	0.1949	0.1334	2.7000e-004		9.0200e-003	9.0200e-003		8.3500e-003	8.3500e-003	0.0000	23.5145	23.5145	6.9100e-003	0.0000	23.6873
Total	**0.0185**	**0.1949**	**0.1334**	**2.7000e-004**	**1.8000e-004**	**9.0200e-003**	**9.2000e-003**	**2.0000e-005**	**8.3500e-003**	**8.3700e-003**	**0.0000**	**23.5145**	**23.5145**	**6.9100e-003**	**0.0000**	**23.6873**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.8000e-004	0.0169	3.5200e-003	4.0000e-005	8.9000e-004	7.0000e-005	9.6000e-004	2.4000e-004	6.0000e-005	3.1000e-004	0.0000	4.0978	4.0978	3.7000e-004	0.0000	4.1070
Vendor	7.0000e-005	1.7400e-003	4.8000e-004	0.0000	9.0000e-005	1.0000e-005	1.0000e-004	2.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.3480	0.3480	3.0000e-005	0.0000	0.3487
Worker	8.3000e-004	6.6000e-004	6.3300e-003	2.0000e-005	1.5600e-003	1.0000e-005	1.5800e-003	4.2000e-004	1.0000e-005	4.3000e-004	0.0000	1.5050	1.5050	5.0000e-005	0.0000	1.5063
Total	**1.3800e-003**	**0.0193**	**0.0103**	**6.0000e-005**	**2.5400e-003**	**9.0000e-005**	**2.6400e-003**	**6.8000e-004**	**8.0000e-005**	**7.8000e-004**	**0.0000**	**5.9507**	**5.9507**	**4.5000e-004**	**0.0000**	**5.9620**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					8.0000e-005	0.0000	8.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0185	0.1949	0.1334	2.7000e-004		9.0200e-003	9.0200e-003		8.3500e-003	8.3500e-003	0.0000	23.5144	23.5144	6.9100e-003	0.0000	23.6873
Total	**0.0185**	**0.1949**	**0.1334**	**2.7000e-004**	**8.0000e-005**	**9.0200e-003**	**9.1000e-003**	**1.0000e-005**	**8.3500e-003**	**8.3600e-003**	**0.0000**	**23.5144**	**23.5144**	**6.9100e-003**	**0.0000**	**23.6873**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	4.8000e-004	0.0169	3.5200e-003	4.0000e-005	8.9000e-004	7.0000e-005	9.6000e-004	2.4000e-004	6.0000e-005	3.1000e-004	0.0000	4.0978	4.0978	3.7000e-004	0.0000	4.1070
Vendor	7.0000e-005	1.7400e-003	4.8000e-004	0.0000	9.0000e-005	1.0000e-005	1.0000e-004	2.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.3480	0.3480	3.0000e-005	0.0000	0.3487
Worker	8.3000e-004	6.6000e-004	6.3300e-003	2.0000e-005	1.5600e-003	1.0000e-005	1.5800e-003	4.2000e-004	1.0000e-005	4.3000e-004	0.0000	1.5050	1.5050	5.0000e-005	0.0000	1.5063
Total	**1.3800e-003**	**0.0193**	**0.0103**	**6.0000e-005**	**2.5400e-003**	**9.0000e-005**	**2.6400e-003**	**6.8000e-004**	**8.0000e-005**	**7.8000e-004**	**0.0000**	**5.9507**	**5.9507**	**4.5000e-004**	**0.0000**	**5.9620**

3.5 Utility Trenching - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0119	0.1106	0.0822	1.1000e-004		8.1900e-003	8.1900e-003		7.5300e-003	7.5300e-003	0.0000	9.7455	9.7455	3.0300e-003	0.0000	9.8214
Total	**0.0119**	**0.1106**	**0.0822**	**1.1000e-004**		**8.1900e-003**	**8.1900e-003**		**7.5300e-003**	**7.5300e-003**	**0.0000**	**9.7455**	**9.7455**	**3.0300e-003**	**0.0000**	**9.8214**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.0000e-005	1.7400e-003	4.8000e-004	0.0000	9.0000e-005	1.0000e-005	1.0000e-004	2.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.3480	0.3480	3.0000e-005	0.0000	0.3487
Worker	2.8000e-004	2.2000e-004	2.1100e-003	1.0000e-005	5.2000e-004	0.0000	5.3000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.5017	0.5017	2.0000e-005	0.0000	0.5021
Total	**3.5000e-004**	**1.9600e-003**	**2.5900e-003**	**1.0000e-005**	**6.1000e-004**	**1.0000e-005**	**6.3000e-004**	**1.6000e-004**	**1.0000e-005**	**1.8000e-004**	**0.0000**	**0.8496**	**0.8496**	**5.0000e-005**	**0.0000**	**0.8508**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0119	0.1106	0.0822	1.1000e-004		8.1900e-003	8.1900e-003		7.5300e-003	7.5300e-003	0.0000	9.7455	9.7455	3.0300e-003	0.0000	9.8213
Total	**0.0119**	**0.1106**	**0.0822**	**1.1000e-004**		**8.1900e-003**	**8.1900e-003**		**7.5300e-003**	**7.5300e-003**	**0.0000**	**9.7455**	**9.7455**	**3.0300e-003**	**0.0000**	**9.8213**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	7.0000e-005	1.7400e-003	4.8000e-004	0.0000	9.0000e-005	1.0000e-005	1.0000e-004	2.0000e-005	1.0000e-005	4.0000e-005	0.0000	0.3480	0.3480	3.0000e-005	0.0000	0.3487
Worker	2.8000e-004	2.2000e-004	2.1100e-003	1.0000e-005	5.2000e-004	0.0000	5.3000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.5017	0.5017	2.0000e-005	0.0000	0.5021
Total	**3.5000e-004**	**1.9600e-003**	**2.5900e-003**	**1.0000e-005**	**6.1000e-004**	**1.0000e-005**	**6.3000e-004**	**1.6000e-004**	**1.0000e-005**	**1.8000e-004**	**0.0000**	**0.8496**	**0.8496**	**5.0000e-005**	**0.0000**	**0.8508**

3.6 Building Construction - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0439	0.4570	0.3296	6.1000e-004		0.0232	0.0232		0.0214	0.0214	0.0000	54.0872	54.0872	0.0161	0.0000	54.4885
Total	**0.0439**	**0.4570**	**0.3296**	**6.1000e-004**		**0.0232**	**0.0232**		**0.0214**	**0.0214**	**0.0000**	**54.0872**	**54.0872**	**0.0161**	**0.0000**	**54.4885**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5700e-003	0.0401	0.0110	8.0000e-005	1.9900e-003	3.1000e-004	2.3000e-003	5.7000e-004	3.0000e-004	8.7000e-004	0.0000	8.0298	8.0298	6.6000e-004	0.0000	8.0463
Worker	2.9900e-003	2.3700e-003	0.0227	6.0000e-005	5.6100e-003	4.0000e-005	5.6500e-003	1.4900e-003	4.0000e-005	1.5300e-003	0.0000	5.4024	5.4024	1.9000e-004	0.0000	5.4071
Total	**4.5600e-003**	**0.0424**	**0.0337**	**1.4000e-004**	**7.6000e-003**	**3.5000e-004**	**7.9500e-003**	**2.0600e-003**	**3.4000e-004**	**2.4000e-003**	**0.0000**	**13.4322**	**13.4322**	**8.5000e-004**	**0.0000**	**13.4534**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0439	0.4570	0.3296	6.1000e-004		0.0232	0.0232		0.0214	0.0214	0.0000	54.0871	54.0871	0.0161	0.0000	54.4885
Total	**0.0439**	**0.4570**	**0.3296**	**6.1000e-004**		**0.0232**	**0.0232**		**0.0214**	**0.0214**	**0.0000**	**54.0871**	**54.0871**	**0.0161**	**0.0000**	**54.4885**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.5700e-003	0.0401	0.0110	8.0000e-005	1.9900e-003	3.1000e-004	2.3000e-003	5.7000e-004	3.0000e-004	8.7000e-004	0.0000	8.0298	8.0298	6.6000e-004	0.0000	8.0463
Worker	2.9900e-003	2.3700e-003	0.0227	6.0000e-005	5.6100e-003	4.0000e-005	5.6500e-003	1.4900e-003	4.0000e-005	1.5300e-003	0.0000	5.4024	5.4024	1.9000e-004	0.0000	5.4071
Total	**4.5600e-003**	**0.0424**	**0.0337**	**1.4000e-004**	**7.6000e-003**	**3.5000e-004**	**7.9500e-003**	**2.0600e-003**	**3.4000e-004**	**2.4000e-003**	**0.0000**	**13.4322**	**13.4322**	**8.5000e-004**	**0.0000**	**13.4534**

3.7 Paving - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0997	1.0337	0.7448	1.2300e-003		0.0545	0.0545		0.0503	0.0503	0.0000	110.5948	110.5948	0.0337	0.0000	111.4360
Paving	4.0300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.1037**	**1.0337**	**0.7448**	**1.2300e-003**		**0.0545**	**0.0545**		**0.0503**	**0.0503**	**0.0000**	**110.5948**	**110.5948**	**0.0337**	**0.0000**	**111.4360**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.3000e-004	3.3400e-003	9.2000e-004	1.0000e-005	1.7000e-004	3.0000e-005	1.9000e-004	5.0000e-005	2.0000e-005	7.0000e-005	0.0000	0.6692	0.6692	6.0000e-005	0.0000	0.6705
Worker	3.2100e-003	2.5400e-003	0.0243	6.0000e-005	6.0100e-003	4.0000e-005	6.0600e-003	1.6000e-003	4.0000e-005	1.6400e-003	0.0000	5.7883	5.7883	2.0000e-004	0.0000	5.7933
Total	**3.3400e-003**	**5.8800e-003**	**0.0253**	**7.0000e-005**	**6.1800e-003**	**7.0000e-005**	**6.2500e-003**	**1.6500e-003**	**6.0000e-005**	**1.7100e-003**	**0.0000**	**6.4575**	**6.4575**	**2.6000e-004**	**0.0000**	**6.4638**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0997	1.0337	0.7448	1.2300e-003		0.0545	0.0545		0.0503	0.0503	0.0000	110.5947	110.5947	0.0337	0.0000	111.4359
Paving	4.0300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.1037**	**1.0337**	**0.7448**	**1.2300e-003**		**0.0545**	**0.0545**		**0.0503**	**0.0503**	**0.0000**	**110.5947**	**110.5947**	**0.0337**	**0.0000**	**111.4359**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.3000e-004	3.3400e-003	9.2000e-004	1.0000e-005	1.7000e-004	3.0000e-005	1.9000e-004	5.0000e-005	2.0000e-005	7.0000e-005	0.0000	0.6692	0.6692	6.0000e-005	0.0000	0.6705
Worker	3.2100e-003	2.5400e-003	0.0243	6.0000e-005	6.0100e-003	4.0000e-005	6.0600e-003	1.6000e-003	4.0000e-005	1.6400e-003	0.0000	5.7883	5.7883	2.0000e-004	0.0000	5.7933
Total	**3.3400e-003**	**5.8800e-003**	**0.0253**	**7.0000e-005**	**6.1800e-003**	**7.0000e-005**	**6.2500e-003**	**1.6500e-003**	**6.0000e-005**	**1.7100e-003**	**0.0000**	**6.4575**	**6.4575**	**2.6000e-004**	**0.0000**	**6.4638**

A-2 Overlay Construction Scenarios - Emissions Calculations and Model Output

Construction
Summary

Oceanside
Overlay Construction Modeling

Construction:

Scenario	ROG	NOx	CO	SOx	PM10	PM2.5	CO2e Total	CO2e Amortized
Threshold	75	250	550	250	100	55		
1a	34.0482	33.4728	26.6399	0.0453	3.0408	2.0637	163.3926	5.44642
1b	2	7	20		32	26		
2a	12.2173	33.4728	26.6399	0.0453	3.0408	2.0637	163.3926	5.44642
2b	6	7	20		32	26		
3a	12.3669	49.2481	36.4199	0.0597	4.7027	3.1084		
3b	6	5	15		21	17		
4a	81.4082	56.7834	46.9641	0.0938	5.8831	3.5997		
4b	0	4	11		16	15		
5a	26.8311	56.7834	46.9641	0.0938	5.8831	3.5997	868.7526	28.95842
5b	2	4	11		16	15		
6a	21.5242	43.5982	34.3897	0.0614	4.1824	2.722	431.561	14.38537
6b	3	5	15		23	20		

a= Emissions from modeling

b= Number of lots that can be active per day based on emissions

Assumptions:

1 1 acre; 65 units; 30,000 sqft retail; 20,000 sq ft Demo; 90 day arch coating; Fugitive dust reduction; no mitigation

2 1 acre; 65 units; 30,000 sqft retail; 20,000 sq ft Demo; 90 day arch coating; Fugitive dust reduction; 10 g/l indoor architecture

3 5 acre; 65 units; 30,000 sqft retail; 20,000 sq ft Demo; 90 day arch coating; Fugitive dust reduction; 10 g/l indoor architecture

4 5 acre; 325 units; 150,000 sqft retail; 100,000 sq ft Demo; 180 day arch coating; Fugitive dust reduction; 250 g/l indoor architecture

5 5 acre; 325 units; 150,000 sqft retail; 100,000 sq ft Demo; 180 day arch coating; Fugitive dust reduction; 10 g/l indoor architecture

6 2 acre; 130 units; 60,000 sqft retail; 40,000 sqft demo; 90 days arch coating; fugitive dust reduction; 10 g/l indoor architecture.

Acres	ROG	NOx	CO	SOx	PM10	PM2.5	CO2e	Amortized CO2e
5	26.8311	56.7834	46.9641	0.0938	5.8831	3.5997	868.7526	
1	12.2173	33.4728	26.6399	0.0453	3.0408	2.0637	163.3926	
1	12.2173	33.4728	26.6399	0.0453	3.0408	2.0637	163.3926	
1	12.2173	33.4728	26.6399	0.0453	3.0408	2.0637	163.3926	
Total	63.483	157.2018	126.8838	0.2297	15.0055	9.7908	490.1778	16.34

Acres	ROG	NOx	CO	SOx	PM10	PM2.5	CO2e	Amortized CO2e
5	26.8311	56.7834	46.9641	0.0938	5.8831	3.5997	868.7526	
2	21.5242	43.5982	34.3897	0.0614	4.1824	2.722	431.561	
2	21.5242	43.5982	34.3897	0.0614	4.1824	2.722	431.561	
Total	69.8795	143.9798	115.7435	0.2166	14.2479	9.0437	1731.875	57.73

Acres	ROG	NOx	CO	SOx	PM10	PM2.5	CO2e	Amortized CO2e
2	21.5242	43.5982	34.3897	0.0614	4.1824	2.722	431.561	
2	21.5242	43.5982	34.3897	0.0614	4.1824	2.722	431.561	
2	21.5242	43.5982	34.3897	0.0614	4.1824	2.722	431.561	
Total	64.5726	130.7946	103.1691	0.1842	12.5472	8.166	1294.683	43.16

Acres	ROG	NOx	CO	SOx	PM10	PM2.5	CO2e	Amortized CO2e
5	26.8311	56.7834	46.9641	0.0938	5.8831	3.5997	868.7526	
5	26.8311	56.7834	46.9641	0.0938	5.8831	3.5997	868.7526	
Total	53.6622	113.5668	93.9282	0.1876	11.7662	7.1994	1737.505	57.92

Construction
Scenario 1
CalEEMod

Oceanside Construction Overlay - San Diego County, Winter

Oceanside Construction Overlay

S1 - San Diego County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	65.00	Dwelling Unit	0.31	65,000.00	186
Strip Mall	30.00	1000sqft	0.69	30,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - see assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	150
tblConstructionPhase	NumDays	5.00	90.00
tblConstructionPhase	PhaseEndDate	12/30/2016	10/4/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	6/6/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/13/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/17/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/7/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	6/1/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/18/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/14/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/1/2017
tblLandUse	LotAcreage	1.71	0.31
tblProjectCharacteristics	OperationalYear	2018	2019

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	34.0482	33.4728	26.5658	0.0449	4.9800	1.9932	5.8542	2.5430	1.8900	3.3473	0.0000	4,359.9286	4,359.9286	0.8954	0.0000	4,382.3129
Maximum	**34.0482**	**33.4728**	**26.5658**	**0.0449**	**4.9800**	**1.9932**	**5.8542**	**2.5430**	**1.8900**	**3.3473**	**0.0000**	**4,359.9286**	**4,359.9286**	**0.8954**	**0.0000**	**4,382.3129**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	34.0482	33.4728	26.5658	0.0449	2.1666	1.9932	3.0408	1.0971	1.8900	2.0637	0.0000	4,359.9286	4,359.9286	0.8954	0.0000	4,382.3129
Maximum	**34.0482**	**33.4728**	**26.5658**	**0.0449**	**2.1666**	**1.9932**	**3.0408**	**1.0971**	**1.8900**	**2.0637**	**0.0000**	**4,359.9286**	**4,359.9286**	**0.8954**	**0.0000**	**4,382.3129**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**56.49**	**0.00**	**48.06**	**56.86**	**0.00**	**38.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Building Construction	Building Construction	1/18/2017	6/6/2017	5	100	
2	Demolition	Demolition	1/1/2017	1/13/2017	5	10	
3	Grading	Grading	1/14/2017	1/17/2017	5	2	
4	Architectural Coating	Architectural Coating	6/1/2017	10/4/2017	5	90	
5	Paving	Paving	2/1/2017	2/7/2017	5	5	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0.75

Acres of Paving: 0

Residential Indoor: 131,625; Residential Outdoor: 43,875; Non-Residential Indoor: 45,000; Non-Residential Outdoor: 15,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Paving	Pavers	1	6.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	11.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	56.00	12.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	5	13.00	0.00	91.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

Grading	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.9653	19.2365	14.3568	0.0220		1.2313	1.2313		1.1875	1.1875		2,043.8641	2,043.8641	0.4298		2,054.6085
Total	**2.9653**	**19.2365**	**14.3568**	**0.0220**		**1.2313**	**1.2313**		**1.1875**	**1.1875**		**2,043.8641**	**2,043.8641**	**0.4298**		**2,054.6085**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Vendor	0.0744	1.6993	0.5128	3.2800e-003	0.0812	0.0160	0.0973	0.0234	0.0153	0.0387		350.1979	350.1979	0.0316		350.9882
Worker	0.2972	0.2180	2.0626	4.8800e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		485.3622	485.3622	0.0183		485.8199
Total	**0.3716**	**1.9173**	**2.5754**	**8.1600e-003**	**0.5413**	**0.0194**	**0.5607**	**0.1454**	**0.0185**	**0.1639**		**835.5601**	**835.5601**	**0.0499**		**836.8081**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.9653	19.2365	14.3568	0.0220		1.2313	1.2313		1.1875	1.1875	0.0000	2,043.8641	2,043.8641	0.4298		2,054.6085
Total	**2.9653**	**19.2365**	**14.3568**	**0.0220**		**1.2313**	**1.2313**		**1.1875**	**1.1875**	**0.0000**	**2,043.8641**	**2,043.8641**	**0.4298**		**2,054.6085**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0744	1.6993	0.5128	3.2800e-003	0.0812	0.0160	0.0973	0.0234	0.0153	0.0387		350.1979	350.1979	0.0316		350.9882
Worker	0.2972	0.2180	2.0626	4.8800e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		485.3622	485.3622	0.0183		485.8199
Total	**0.3716**	**1.9173**	**2.5754**	**8.1600e-003**	**0.5413**	**0.0194**	**0.5607**	**0.1454**	**0.0185**	**0.1639**		**835.5601**	**835.5601**	**0.0499**		**836.8081**

3.3 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.9933	0.0000	1.9933	0.3019	0.0000	0.3019			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404		2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**1.9933**	**1.6477**	**3.6409**	**0.3019**	**1.5404**	**1.8422**		**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1006	3.1906	0.6823	7.2900e-003	0.1590	0.0181	0.1771	0.0436	0.0173	0.0609		789.8992	789.8992	0.0740		791.7502
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0690	0.0506	0.4788	1.1300e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		112.6734	112.6734	4.2500e-003		112.7796
Total	**0.1696**	**3.2413**	**1.1611**	**8.4200e-003**	**0.2658**	**0.0189**	**0.2847**	**0.0719**	**0.0181**	**0.0900**		**902.5725**	**902.5725**	**0.0783**		**904.5299**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.8521	0.0000	0.8521	0.1290	0.0000	0.1290			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404	0.0000	2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**0.8521**	**1.6477**	**2.4998**	**0.1290**	**1.5404**	**1.6694**	**0.0000**	**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1006	3.1906	0.6823	7.2900e-003	0.1590	0.0181	0.1771	0.0436	0.0173	0.0609		789.8992	789.8992	0.0740		791.7502
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0690	0.0506	0.4788	1.1300e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		112.6734	112.6734	4.2500e-003		112.7796
Total	**0.1696**	**3.2413**	**1.1611**	**8.4200e-003**	**0.2658**	**0.0189**	**0.2847**	**0.0719**	**0.0181**	**0.0900**		**902.5725**	**902.5725**	**0.0783**		**904.5299**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9143	0.0000	4.9143	2.5256	0.0000	2.5256			0.0000			0.0000

Off-Road	1.6023	18.2915	7.0342	0.0141		0.8738	0.8738		0.8039	0.8039		1,444.8958	1,444.8958	0.4427		1,455.9636
Total	**1.6023**	**18.2915**	**7.0342**	**0.0141**	**4.9143**	**0.8738**	**5.7880**	**2.5256**	**0.8039**	**3.3295**		**1,444.8958**	**1,444.8958**	**0.4427**		**1,455.9636**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0425	0.0312	0.2947	7.0000e-004	0.0657	4.8000e-004	0.0662	0.0174	4.5000e-004	0.0179		69.3375	69.3375	2.6200e-003		69.4029
Total	**0.0425**	**0.0312**	**0.2947**	**7.0000e-004**	**0.0657**	**4.8000e-004**	**0.0662**	**0.0174**	**4.5000e-004**	**0.0179**		**69.3375**	**69.3375**	**2.6200e-003**		**69.4029**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.1008	0.0000	2.1008	1.0797	0.0000	1.0797			0.0000			0.0000
Off-Road	1.6023	18.2915	7.0342	0.0141		0.8738	0.8738		0.8039	0.8039	0.0000	1,444.8958	1,444.8958	0.4427		1,455.9636
Total	**1.6023**	**18.2915**	**7.0342**	**0.0141**	**2.1008**	**0.8738**	**2.9746**	**1.0797**	**0.8039**	**1.8836**	**0.0000**	**1,444.8958**	**1,444.8958**	**0.4427**		**1,455.9636**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0425	0.0312	0.2947	7.0000e-004	0.0657	4.8000e-004	0.0662	0.0174	4.5000e-004	0.0179		69.3375	69.3375	2.6200e-003		69.4029
Total	**0.0425**	**0.0312**	**0.2947**	**7.0000e-004**	**0.0657**	**4.8000e-004**	**0.0662**	**0.0174**	**4.5000e-004**	**0.0179**		**69.3375**	**69.3375**	**2.6200e-003**		**69.4029**

3.5 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	30.3206					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**30.6529**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day											lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0584	0.0428	0.4052	9.6000e-004	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		95.3390	95.3390	3.6000e-003		95.4289
Total	**0.0584**	**0.0428**	**0.4052**	**9.6000e-004**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**95.3390**	**95.3390**	**3.6000e-003**		**95.4289**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	30.3206					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**30.6529**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Worker	0.0584	0.0428	0.4052	9.6000e-004	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		95.3390	95.3390	3.6000e-003		95.4289
Total	**0.0584**	**0.0428**	**0.4052**	**9.6000e-004**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**95.3390**	**95.3390**	**3.6000e-003**		**95.4289**

3.6 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2008	12.2685	9.1549	0.0135		0.7417	0.7417		0.6832	0.6832		1,367.8311	1,367.8311	0.4114		1,378.1167
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2008**	**12.2685**	**9.1549**	**0.0135**		**0.7417**	**0.7417**		**0.6832**	**0.6832**		**1,367.8311**	**1,367.8311**	**0.4114**		**1,378.1167**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0690	0.0506	0.4788	1.1300e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		112.6734	112.6734	4.2500e-003		112.7796
Total	**0.0690**	**0.0506**	**0.4788**	**1.1300e-003**	**0.1068**	**7.9000e-004**	**0.1076**	**0.0283**	**7.3000e-004**	**0.0291**		**112.6734**	**112.6734**	**4.2500e-003**		**112.7796**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2008	12.2685	9.1549	0.0135		0.7417	0.7417		0.6832	0.6832	0.0000	1,367.8311	1,367.8311	0.4114		1,378.1167
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2008**	**12.2685**	**9.1549**	**0.0135**		**0.7417**	**0.7417**		**0.6832**	**0.6832**	**0.0000**	**1,367.8311**	**1,367.8311**	**0.4114**		**1,378.1167**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0690	0.0506	0.4788	1.1300e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		112.6734	112.6734	4.2500e-003		112.7796
Total	**0.0690**	**0.0506**	**0.4788**	**1.1300e-003**	**0.1068**	**7.9000e-004**	**0.1076**	**0.0283**	**7.3000e-004**	**0.0291**		**112.6734**	**112.6734**	**4.2500e-003**		**112.7796**

4.0 Operational Detail - Mobile

Oceanside Construction Overlay

S1 - San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	65.00	Dwelling Unit	0.31	65,000.00	186
Strip Mall	30.00	1000sqft	0.69	30,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - see assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	150
tblConstructionPhase	NumDays	5.00	90.00
tblConstructionPhase	PhaseEndDate	12/30/2016	10/4/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	6/6/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/13/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/17/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/7/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	6/1/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/18/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/14/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/1/2017
tblLandUse	LotAcreage	1.71	0.31
tblProjectCharacteristics	OperationalYear	2018	2019

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	34.0047	33.4381	26.6399	0.0453	4.9800	1.9930	5.8542	2.5430	1.8897	3.3473	0.0000	4,407.5662	4,407.5662	0.8945	0.0000	4,429.9295
Maximum	**34.0047**	**33.4381**	**26.6399**	**0.0453**	**4.9800**	**1.9930**	**5.8542**	**2.5430**	**1.8897**	**3.3473**	**0.0000**	**4,407.5662**	**4,407.5662**	**0.8945**	**0.0000**	**4,429.9295**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	34.0047	33.4381	26.6399	0.0453	2.1666	1.9930	3.0408	1.0971	1.8897	2.0635	0.0000	4,407.5662	4,407.5662	0.8945	0.0000	4,429.9295
Maximum	**34.0047**	**33.4381**	**26.6399**	**0.0453**	**2.1666**	**1.9930**	**3.0408**	**1.0971**	**1.8897**	**2.0635**	**0.0000**	**4,407.5662**	**4,407.5662**	**0.8945**	**0.0000**	**4,429.9295**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**56.49**	**0.00**	**48.06**	**56.86**	**0.00**	**38.36**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Building Construction	Building Construction	1/18/2017	6/6/2017	5	100	
2	Demolition	Demolition	1/1/2017	1/13/2017	5	10	
3	Grading	Grading	1/14/2017	1/17/2017	5	2	
4	Architectural Coating	Architectural Coating	6/1/2017	10/4/2017	5	90	
5	Paving	Paving	2/1/2017	2/7/2017	5	5	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0.75

Acres of Paving: 0

Residential Indoor: 131,625; Residential Outdoor: 43,875; Non-Residential Indoor: 45,000; Non-Residential Outdoor: 15,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Paving	Pavers	1	6.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	11.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	56.00	12.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	5	13.00	0.00	91.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

Grading	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.9653	19.2365	14.3568	0.0220		1.2313	1.2313		1.1875	1.1875		2,043.8641	2,043.8641	0.4298		2,054.6085
Total	**2.9653**	**19.2365**	**14.3568**	**0.0220**		**1.2313**	**1.2313**		**1.1875**	**1.1875**		**2,043.8641**	**2,043.8641**	**0.4298**		**2,054.6085**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Vendor	0.0715	1.6940	0.4648	3.3600e-003	0.0812	0.0158	0.0970	0.0234	0.0151	0.0385		358.9235	358.9235	0.0297		359.6660
Worker	0.2632	0.1941	2.1616	5.2000e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		516.9429	516.9429	0.0192		517.4224
Total	**0.3347**	**1.8881**	**2.6264**	**8.5600e-003**	**0.5413**	**0.0192**	**0.5604**	**0.1454**	**0.0182**	**0.1636**		**875.8664**	**875.8664**	**0.0489**		**877.0884**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.9653	19.2365	14.3568	0.0220		1.2313	1.2313		1.1875	1.1875	0.0000	2,043.8641	2,043.8641	0.4298		2,054.6085
Total	**2.9653**	**19.2365**	**14.3568**	**0.0220**		**1.2313**	**1.2313**		**1.1875**	**1.1875**	**0.0000**	**2,043.8641**	**2,043.8641**	**0.4298**		**2,054.6085**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0715	1.6940	0.4648	3.3600e-003	0.0812	0.0158	0.0970	0.0234	0.0151	0.0385		358.9235	358.9235	0.0297		359.6660
Worker	0.2632	0.1941	2.1616	5.2000e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		516.9429	516.9429	0.0192		517.4224
Total	**0.3347**	**1.8881**	**2.6264**	**8.5600e-003**	**0.5413**	**0.0192**	**0.5604**	**0.1454**	**0.0182**	**0.1636**		**875.8664**	**875.8664**	**0.0489**		**877.0884**

3.3 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.9933	0.0000	1.9933	0.3019	0.0000	0.3019			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404		2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**1.9933**	**1.6477**	**3.6409**	**0.3019**	**1.5404**	**1.8422**		**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0980	3.1528	0.6342	7.4000e-003	0.1590	0.0178	0.1768	0.0436	0.0170	0.0606		802.7089	802.7089	0.0713		804.4911
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0611	0.0451	0.5018	1.2100e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		120.0046	120.0046	4.4500e-003		120.1159
Total	**0.1591**	**3.1979**	**1.1360**	**8.6100e-003**	**0.2658**	**0.0186**	**0.2844**	**0.0719**	**0.0178**	**0.0897**		**922.7135**	**922.7135**	**0.0757**		**924.6070**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.8521	0.0000	0.8521	0.1290	0.0000	0.1290			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404	0.0000	2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**0.8521**	**1.6477**	**2.4998**	**0.1290**	**1.5404**	**1.6694**	**0.0000**	**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0980	3.1528	0.6342	7.4000e-003	0.1590	0.0178	0.1768	0.0436	0.0170	0.0606		802.7089	802.7089	0.0713		804.4911
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0611	0.0451	0.5018	1.2100e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		120.0046	120.0046	4.4500e-003		120.1159
Total	**0.1591**	**3.1979**	**1.1360**	**8.6100e-003**	**0.2658**	**0.0186**	**0.2844**	**0.0719**	**0.0178**	**0.0897**		**922.7135**	**922.7135**	**0.0757**		**924.6070**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9143	0.0000	4.9143	2.5256	0.0000	2.5256			0.0000			0.0000

Off-Road	1.6023	18.2915	7.0342	0.0141		0.8738	0.8738		0.8039	0.8039		1,444.8958	1,444.8958	0.4427		1,455.9636
Total	**1.6023**	**18.2915**	**7.0342**	**0.0141**	**4.9143**	**0.8738**	**5.7880**	**2.5256**	**0.8039**	**3.3295**		**1,444.8958**	**1,444.8958**	**0.4427**		**1,455.9636**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0376	0.0277	0.3088	7.4000e-004	0.0657	4.8000e-004	0.0662	0.0174	4.5000e-004	0.0179		73.8490	73.8490	2.7400e-003		73.9175
Total	**0.0376**	**0.0277**	**0.3088**	**7.4000e-004**	**0.0657**	**4.8000e-004**	**0.0662**	**0.0174**	**4.5000e-004**	**0.0179**		**73.8490**	**73.8490**	**2.7400e-003**		**73.9175**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.1008	0.0000	2.1008	1.0797	0.0000	1.0797			0.0000			0.0000
Off-Road	1.6023	18.2915	7.0342	0.0141		0.8738	0.8738		0.8039	0.8039	0.0000	1,444.8958	1,444.8958	0.4427		1,455.9636
Total	**1.6023**	**18.2915**	**7.0342**	**0.0141**	**2.1008**	**0.8738**	**2.9746**	**1.0797**	**0.8039**	**1.8836**	**0.0000**	**1,444.8958**	**1,444.8958**	**0.4427**		**1,455.9636**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0376	0.0277	0.3088	7.4000e-004	0.0657	4.8000e-004	0.0662	0.0174	4.5000e-004	0.0179		73.8490	73.8490	2.7400e-003		73.9175
Total	**0.0376**	**0.0277**	**0.3088**	**7.4000e-004**	**0.0657**	**4.8000e-004**	**0.0662**	**0.0174**	**4.5000e-004**	**0.0179**		**73.8490**	**73.8490**	**2.7400e-003**		**73.9175**

3.5 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	30.3206					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**30.6529**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day											lb/day				
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0517	0.0381	0.4246	1.0200e-003	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		101.5424	101.5424	3.7700e-003		101.6366
Total	**0.0517**	**0.0381**	**0.4246**	**1.0200e-003**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**101.5424**	**101.5424**	**3.7700e-003**		**101.6366**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	30.3206					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**30.6529**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Worker	0.0517	0.0381	0.4246	1.0200e-003	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		101.5424	101.5424	3.7700e-003		101.6366
Total	**0.0517**	**0.0381**	**0.4246**	**1.0200e-003**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**101.5424**	**101.5424**	**3.7700e-003**		**101.6366**

3.6 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2008	12.2685	9.1549	0.0135		0.7417	0.7417		0.6832	0.6832		1,367.8311	1,367.8311	0.4114		1,378.1167
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2008**	**12.2685**	**9.1549**	**0.0135**		**0.7417**	**0.7417**		**0.6832**	**0.6832**		**1,367.8311**	**1,367.8311**	**0.4114**		**1,378.1167**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0611	0.0451	0.5018	1.2100e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		120.0046	120.0046	4.4500e-003		120.1159
Total	**0.0611**	**0.0451**	**0.5018**	**1.2100e-003**	**0.1068**	**7.9000e-004**	**0.1076**	**0.0283**	**7.3000e-004**	**0.0291**		**120.0046**	**120.0046**	**4.4500e-003**		**120.1159**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2008	12.2685	9.1549	0.0135		0.7417	0.7417		0.6832	0.6832	0.0000	1,367.8311	1,367.8311	0.4114		1,378.1167
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2008**	**12.2685**	**9.1549**	**0.0135**		**0.7417**	**0.7417**		**0.6832**	**0.6832**	**0.0000**	**1,367.8311**	**1,367.8311**	**0.4114**		**1,378.1167**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0611	0.0451	0.5018	1.2100e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		120.0046	120.0046	4.4500e-003		120.1159
Total	**0.0611**	**0.0451**	**0.5018**	**1.2100e-003**	**0.1068**	**7.9000e-004**	**0.1076**	**0.0283**	**7.3000e-004**	**0.0291**		**120.0046**	**120.0046**	**4.4500e-003**		**120.1159**

4.0 Operational Detail - Mobile

Oceanside - Overlay - San Diego County, Annual

Oceanside - Overlay

Senario 1 - San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	65.00	Dwelling Unit	0.31	65,000.00	186
Strip Mall	30.00	1000sqft	0.69	30,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - see assumptions

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	5.00	90.00
tblConstructionPhase	PhaseEndDate	12/30/2016	10/13/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	6/13/2017

tblConstructionPhase	PhaseEndDate	12/30/2016	1/13/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/17/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/24/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	6/10/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/25/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/14/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/18/2017
tblLandUse	LotAcreage	1.71	0.31
tblProjectCharacteristics	OperationalYear	2018	2019

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	1.5658	1.3418	1.0590	1.8700e-003	0.0362	0.0813	0.1175	0.0109	0.0783	0.0893	0.0000	162.7121	162.7121	0.0272	0.0000	163.3926
Maximum	**1.5658**	**1.3418**	**1.0590**	**1.8700e-003**	**0.0362**	**0.0813**	**0.1175**	**0.0109**	**0.0783**	**0.0893**	**0.0000**	**162.7121**	**162.7121**	**0.0272**	**0.0000**	**163.3926**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Year	tons/yr										MT/yr					
2017	1.5658	1.3418	1.0590	1.8700e-003	0.0334	0.0813	0.1147	9.4800e-003	0.0783	0.0878	0.0000	162.7120	162.7120	0.0272	0.0000	163.3925
Maximum	**1.5658**	**1.3418**	**1.0590**	**1.8700e-003**	**0.0334**	**0.0813**	**0.1147**	**9.4800e-003**	**0.0783**	**0.0878**	**0.0000**	**162.7120**	**162.7120**	**0.0272**	**0.0000**	**163.3925**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**7.80**	**0.00**	**2.39**	**13.19**	**0.00**	**1.61**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**1-1-2017**	**3-31-2017**	0.7774	0.7774
2	**4-1-2017**	**6-30-2017**	0.8925	0.8925
3	**7-1-2017**	**9-30-2017**	1.0819	1.0819
		Highest	1.0819	1.0819

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/13/2017	5	10	
2	Grading	Grading	1/14/2017	1/17/2017	5	2	
3	Paving	Paving	1/18/2017	1/24/2017	5	5	
4	Building Construction	Building Construction	1/25/2017	6/13/2017	5	100	
5	Architectural Coating	Architectural Coating	6/10/2017	10/13/2017	5	90	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0.75

Acres of Paving: 0

Residential Indoor: 131,625; Residential Outdoor: 43,875; Non-Residential Indoor: 45,000; Non-Residential Outdoor: 15,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Paving	Pavers	1	6.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	11.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	56.00	12.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0138	0.1338	0.0778	1.2000e-004		8.2400e-003	8.2400e-003		7.7000e-003	7.7000e-003	0.0000	10.9834	10.9834	2.7800e-003	0.0000	11.0528
Total	**0.0138**	**0.1338**	**0.0778**	**1.2000e-004**		**8.2400e-003**	**8.2400e-003**		**7.7000e-003**	**7.7000e-003**	**0.0000**	**10.9834**	**10.9834**	**2.7800e-003**	**0.0000**	**11.0528**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.5000e-004	2.3900e-003	1.0000e-005	5.2000e-004	0.0000	5.3000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.5162	0.5162	2.0000e-005	0.0000	0.5167

Total	**3.1000e-004**	**2.5000e-004**	**2.3900e-003**	**1.0000e-005**	**5.2000e-004**	**0.0000**	**5.3000e-004**	**1.4000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.5162**	**0.5162**	**2.0000e-005**	**0.0000**	**0.5167**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0138	0.1338	0.0778	1.2000e-004		8.2400e-003	8.2400e-003		7.7000e-003	7.7000e-003	0.0000	10.9834	10.9834	2.7800e-003	0.0000	11.0528
Total	**0.0138**	**0.1338**	**0.0778**	**1.2000e-004**		**8.2400e-003**	**8.2400e-003**		**7.7000e-003**	**7.7000e-003**	**0.0000**	**10.9834**	**10.9834**	**2.7800e-003**	**0.0000**	**11.0528**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.5000e-004	2.3900e-003	1.0000e-005	5.2000e-004	0.0000	5.3000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.5162	0.5162	2.0000e-005	0.0000	0.5167
Total	**3.1000e-004**	**2.5000e-004**	**2.3900e-003**	**1.0000e-005**	**5.2000e-004**	**0.0000**	**5.3000e-004**	**1.4000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.5162**	**0.5162**	**2.0000e-005**	**0.0000**	**0.5167**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.9100e-003	0.0000	4.9100e-003	2.5300e-003	0.0000	2.5300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.6000e-003	0.0183	7.0300e-003	1.0000e-005		8.7000e-004	8.7000e-004		8.0000e-004	8.0000e-004	0.0000	1.3108	1.3108	4.0000e-004	0.0000	1.3208
Total	**1.6000e-003**	**0.0183**	**7.0300e-003**	**1.0000e-005**	**4.9100e-003**	**8.7000e-004**	**5.7800e-003**	**2.5300e-003**	**8.0000e-004**	**3.3300e-003**	**0.0000**	**1.3108**	**1.3108**	**4.0000e-004**	**0.0000**	**1.3208**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0000e-005	3.0000e-005	2.9000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0635	0.0635	0.0000	0.0000	0.0636
Total	**4.0000e-005**	**3.0000e-005**	**2.9000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0635**	**0.0635**	**0.0000**	**0.0000**	**0.0636**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Fugitive Dust					2.1000e-003	0.0000	2.1000e-003	1.0800e-003	0.0000	1.0800e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.6000e-003	0.0183	7.0300e-003	1.0000e-005		8.7000e-004	8.7000e-004		8.0000e-004	8.0000e-004	0.0000	1.3108	1.3108	4.0000e-004	0.0000	1.3208
Total	**1.6000e-003**	**0.0183**	**7.0300e-003**	**1.0000e-005**	**2.1000e-003**	**8.7000e-004**	**2.9700e-003**	**1.0800e-003**	**8.0000e-004**	**1.8800e-003**	**0.0000**	**1.3108**	**1.3108**	**4.0000e-004**	**0.0000**	**1.3208**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0000e-005	3.0000e-005	2.9000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0635	0.0635	0.0000	0.0000	0.0636
Total	**4.0000e-005**	**3.0000e-005**	**2.9000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0635**	**0.0635**	**0.0000**	**0.0000**	**0.0636**

3.4 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.0000e-003	0.0307	0.0229	3.0000e-005		1.8500e-003	1.8500e-003		1.7100e-003	1.7100e-003	0.0000	3.1022	3.1022	9.3000e-004	0.0000	3.1255
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.0000e-003**	**0.0307**	**0.0229**	**3.0000e-005**		**1.8500e-003**	**1.8500e-003**		**1.7100e-003**	**1.7100e-003**	**0.0000**	**3.1022**	**3.1022**	**9.3000e-004**	**0.0000**	**3.1255**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.2000e-004	1.1900e-003	0.0000	2.6000e-004	0.0000	2.6000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.2581	0.2581	1.0000e-005	0.0000	0.2583
Total	**1.5000e-004**	**1.2000e-004**	**1.1900e-003**	**0.0000**	**2.6000e-004**	**0.0000**	**2.6000e-004**	**7.0000e-005**	**0.0000**	**7.0000e-005**	**0.0000**	**0.2581**	**0.2581**	**1.0000e-005**	**0.0000**	**0.2583**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.0000e-003	0.0307	0.0229	3.0000e-005		1.8500e-003	1.8500e-003		1.7100e-003	1.7100e-003	0.0000	3.1022	3.1022	9.3000e-004	0.0000	3.1255
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.0000e-003**	**0.0307**	**0.0229**	**3.0000e-005**		**1.8500e-003**	**1.8500e-003**		**1.7100e-003**	**1.7100e-003**	**0.0000**	**3.1022**	**3.1022**	**9.3000e-004**	**0.0000**	**3.1255**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.2000e-004	1.1900e-003	0.0000	2.6000e-004	0.0000	2.6000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.2581	0.2581	1.0000e-005	0.0000	0.2583
Total	**1.5000e-004**	**1.2000e-004**	**1.1900e-003**	**0.0000**	**2.6000e-004**	**0.0000**	**2.6000e-004**	**7.0000e-005**	**0.0000**	**7.0000e-005**	**0.0000**	**0.2581**	**0.2581**	**1.0000e-005**	**0.0000**	**0.2583**

3.5 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1483	0.9618	0.7178	1.1000e-003		0.0616	0.0616		0.0594	0.0594	0.0000	92.7081	92.7081	0.0195	0.0000	93.1955
Total	**0.1483**	**0.9618**	**0.7178**	**1.1000e-003**		**0.0616**	**0.0616**		**0.0594**	**0.0594**	**0.0000**	**92.7081**	**92.7081**	**0.0195**	**0.0000**	**93.1955**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Vendor	3.6300e-003	0.0859	0.0244	1.7000e-004	3.9800e-003	7.9000e-004	4.7800e-003	1.1500e-003	7.6000e-004	1.9100e-003	0.0000	16.1143	16.1143	1.3900e-003	0.0000	16.1489
Worker	0.0132	0.0107	0.1029	2.5000e-004	0.0225	1.7000e-004	0.0226	5.9700e-003	1.6000e-004	6.1200e-003	0.0000	22.2351	22.2351	8.3000e-004	0.0000	22.2560
Total	**0.0169**	**0.0966**	**0.1273**	**4.2000e-004**	**0.0264**	**9.6000e-004**	**0.0274**	**7.1200e-003**	**9.2000e-004**	**8.0300e-003**	**0.0000**	**38.3494**	**38.3494**	**2.2200e-003**	**0.0000**	**38.4049**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1483	0.9618	0.7178	1.1000e-003		0.0616	0.0616		0.0594	0.0594	0.0000	92.7080	92.7080	0.0195	0.0000	93.1954
Total	**0.1483**	**0.9618**	**0.7178**	**1.1000e-003**		**0.0616**	**0.0616**		**0.0594**	**0.0594**	**0.0000**	**92.7080**	**92.7080**	**0.0195**	**0.0000**	**93.1954**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.6300e-003	0.0859	0.0244	1.7000e-004	3.9800e-003	7.9000e-004	4.7800e-003	1.1500e-003	7.6000e-004	1.9100e-003	0.0000	16.1143	16.1143	1.3900e-003	0.0000	16.1489
Worker	0.0132	0.0107	0.1029	2.5000e-004	0.0225	1.7000e-004	0.0226	5.9700e-003	1.6000e-004	6.1200e-003	0.0000	22.2351	22.2351	8.3000e-004	0.0000	22.2560
Total	**0.0169**	**0.0966**	**0.1273**	**4.2000e-004**	**0.0264**	**9.6000e-004**	**0.0274**	**7.1200e-003**	**9.2000e-004**	**8.0300e-003**	**0.0000**	**38.3494**	**38.3494**	**2.2200e-003**	**0.0000**	**38.4049**

3.6 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.3644					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0150	0.0983	0.0841	1.3000e-004		7.8000e-003	7.8000e-003		7.8000e-003	7.8000e-003	0.0000	11.4896	11.4896	1.2100e-003	0.0000	11.5200
Total	**1.3794**	**0.0983**	**0.0841**	**1.3000e-004**		**7.8000e-003**	**7.8000e-003**		**7.8000e-003**	**7.8000e-003**	**0.0000**	**11.4896**	**11.4896**	**1.2100e-003**	**0.0000**	**11.5200**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3400e-003	1.8900e-003	0.0182	4.0000e-005	3.9700e-003	3.0000e-005	4.0000e-003	1.0500e-003	3.0000e-005	1.0800e-003	0.0000	3.9309	3.9309	1.5000e-004	0.0000	3.9345
Total	**2.3400e-003**	**1.8900e-003**	**0.0182**	**4.0000e-005**	**3.9700e-003**	**3.0000e-005**	**4.0000e-003**	**1.0500e-003**	**3.0000e-005**	**1.0800e-003**	**0.0000**	**3.9309**	**3.9309**	**1.5000e-004**	**0.0000**	**3.9345**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.3644					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0150	0.0983	0.0841	1.3000e-004		7.8000e-003	7.8000e-003		7.8000e-003	7.8000e-003	0.0000	11.4896	11.4896	1.2100e-003	0.0000	11.5200
Total	**1.3794**	**0.0983**	**0.0841**	**1.3000e-004**		**7.8000e-003**	**7.8000e-003**		**7.8000e-003**	**7.8000e-003**	**0.0000**	**11.4896**	**11.4896**	**1.2100e-003**	**0.0000**	**11.5200**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3400e-003	1.8900e-003	0.0182	4.0000e-005	3.9700e-003	3.0000e-005	4.0000e-003	1.0500e-003	3.0000e-005	1.0800e-003	0.0000	3.9309	3.9309	1.5000e-004	0.0000	3.9345
Total	**2.3400e-003**	**1.8900e-003**	**0.0182**	**4.0000e-005**	**3.9700e-003**	**3.0000e-005**	**4.0000e-003**	**1.0500e-003**	**3.0000e-005**	**1.0800e-003**	**0.0000**	**3.9309**	**3.9309**	**1.5000e-004**	**0.0000**	**3.9345**

4.0 Operational Detail - Mobile

Construction
Scenario 2
CalEEMod

Oceanside Construction Overlay - San Diego County, Winter

Oceanside Construction Overlay

S2 - San Diego County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	65.00	Dwelling Unit	0.31	65,000.00	186
Strip Mall	30.00	1000sqft	0.69	30,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - see assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Construction Off-road Equipment Mitigation -

Architectural Coating - see assumptions

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	10.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	10.00
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	150
tblConstructionPhase	NumDays	5.00	90.00
tblConstructionPhase	PhaseEndDate	12/30/2016	10/4/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	6/6/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/13/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/17/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/7/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	6/1/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/18/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/14/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/1/2017
tblLandUse	LotAcreage	1.71	0.31
tblProjectCharacteristics	OperationalYear	2018	2019

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					

2017	12.2173	33.4728	26.5658	0.0449	4.9800	1.9932	5.8542	2.5430	1.8900	3.3473	0.0000	4,359.9286	4,359.9286	0.8954	0.0000	4,382.3129
Maximum	**12.2173**	**33.4728**	**26.5658**	**0.0449**	**4.9800**	**1.9932**	**5.8542**	**2.5430**	**1.8900**	**3.3473**	**0.0000**	**4,359.9286**	**4,359.9286**	**0.8954**	**0.0000**	**4,382.3129**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	12.2173	33.4728	26.5658	0.0449	2.1666	1.9932	3.0408	1.0971	1.8900	2.0637	0.0000	4,359.9286	4,359.9286	0.8954	0.0000	4,382.3129
Maximum	**12.2173**	**33.4728**	**26.5658**	**0.0449**	**2.1666**	**1.9932**	**3.0408**	**1.0971**	**1.8900**	**2.0637**	**0.0000**	**4,359.9286**	**4,359.9286**	**0.8954**	**0.0000**	**4,382.3129**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**56.49**	**0.00**	**48.06**	**56.86**	**0.00**	**38.35**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Building Construction	Building Construction	1/18/2017	6/6/2017	5	100	
2	Demolition	Demolition	1/1/2017	1/13/2017	5	10	
3	Grading	Grading	1/14/2017	1/17/2017	5	2	

4	Architectural Coating	Architectural Coating	6/1/2017	10/4/2017	5	90	
5	Paving	Paving	2/1/2017	2/7/2017	5	5	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0.75

Acres of Paving: 0

Residential Indoor: 131,625; Residential Outdoor: 43,875; Non-Residential Indoor: 45,000; Non-Residential Outdoor: 15,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Paving	Pavers	1	6.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	11.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	56.00	12.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	5	13.00	0.00	91.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.9653	19.2365	14.3568	0.0220		1.2313	1.2313		1.1875	1.1875		2,043.8641	2,043.8641	0.4298		2,054.6085
Total	**2.9653**	**19.2365**	**14.3568**	**0.0220**		**1.2313**	**1.2313**		**1.1875**	**1.1875**		**2,043.8641**	**2,043.8641**	**0.4298**		**2,054.6085**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0744	1.6993	0.5128	3.2800e-003	0.0812	0.0160	0.0973	0.0234	0.0153	0.0387		350.1979	350.1979	0.0316		350.9882
Worker	0.2972	0.2180	2.0626	4.8800e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		485.3622	485.3622	0.0183		485.8199
Total	**0.3716**	**1.9173**	**2.5754**	**8.1600e-003**	**0.5413**	**0.0194**	**0.5607**	**0.1454**	**0.0185**	**0.1639**		**835.5601**	**835.5601**	**0.0499**		**836.8081**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.9653	19.2365	14.3568	0.0220		1.2313	1.2313		1.1875	1.1875	0.0000	2,043.8641	2,043.8641	0.4298		2,054.6085
Total	**2.9653**	**19.2365**	**14.3568**	**0.0220**		**1.2313**	**1.2313**		**1.1875**	**1.1875**	**0.0000**	**2,043.8641**	**2,043.8641**	**0.4298**		**2,054.6085**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0744	1.6993	0.5128	3.2800e-003	0.0812	0.0160	0.0973	0.0234	0.0153	0.0387		350.1979	350.1979	0.0316		350.9882
Worker	0.2972	0.2180	2.0626	4.8800e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		485.3622	485.3622	0.0183		485.8199
Total	**0.3716**	**1.9173**	**2.5754**	**8.1600e-003**	**0.5413**	**0.0194**	**0.5607**	**0.1454**	**0.0185**	**0.1639**		**835.5601**	**835.5601**	**0.0499**		**836.8081**

3.3 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.9933	0.0000	1.9933	0.3019	0.0000	0.3019			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404		2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**1.9933**	**1.6477**	**3.6409**	**0.3019**	**1.5404**	**1.8422**		**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1006	3.1906	0.6823	7.2900e-003	0.1590	0.0181	0.1771	0.0436	0.0173	0.0609		789.8992	789.8992	0.0740		791.7502
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0690	0.0506	0.4788	1.1300e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		112.6734	112.6734	4.2500e-003		112.7796

Total	**0.1696**	**3.2413**	**1.1611**	**8.4200e-003**	**0.2658**	**0.0189**	**0.2847**	**0.0719**	**0.0181**	**0.0900**		**902.5725**	**902.5725**	**0.0783**		**904.5299**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.8521	0.0000	0.8521	0.1290	0.0000	0.1290			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404	0.0000	2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**0.8521**	**1.6477**	**2.4998**	**0.1290**	**1.5404**	**1.6694**	**0.0000**	**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1006	3.1906	0.6823	7.2900e-003	0.1590	0.0181	0.1771	0.0436	0.0173	0.0609		789.8992	789.8992	0.0740		791.7502
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0690	0.0506	0.4788	1.1300e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		112.6734	112.6734	4.2500e-003		112.7796
Total	**0.1696**	**3.2413**	**1.1611**	**8.4200e-003**	**0.2658**	**0.0189**	**0.2847**	**0.0719**	**0.0181**	**0.0900**		**902.5725**	**902.5725**	**0.0783**		**904.5299**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9143	0.0000	4.9143	2.5256	0.0000	2.5256			0.0000			0.0000
Off-Road	1.6023	18.2915	7.0342	0.0141		0.8738	0.8738		0.8039	0.8039		1,444.8958	1,444.8958	0.4427		1,455.9636
Total	**1.6023**	**18.2915**	**7.0342**	**0.0141**	**4.9143**	**0.8738**	**5.7880**	**2.5256**	**0.8039**	**3.3295**		**1,444.8958**	**1,444.8958**	**0.4427**		**1,455.9636**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0425	0.0312	0.2947	7.0000e-004	0.0657	4.8000e-004	0.0662	0.0174	4.5000e-004	0.0179		69.3375	69.3375	2.6200e-003		69.4029
Total	**0.0425**	**0.0312**	**0.2947**	**7.0000e-004**	**0.0657**	**4.8000e-004**	**0.0662**	**0.0174**	**4.5000e-004**	**0.0179**		**69.3375**	**69.3375**	**2.6200e-003**		**69.4029**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Fugitive Dust					2.1008	0.0000	2.1008	1.0797	0.0000	1.0797			0.0000			0.0000
Off-Road	1.6023	18.2915	7.0342	0.0141		0.8738	0.8738		0.8039	0.8039	0.0000	1,444.8958	1,444.8958	0.4427		1,455.9636
Total	**1.6023**	**18.2915**	**7.0342**	**0.0141**	**2.1008**	**0.8738**	**2.9746**	**1.0797**	**0.8039**	**1.8836**	**0.0000**	**1,444.8958**	**1,444.8958**	**0.4427**		**1,455.9636**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0425	0.0312	0.2947	7.0000e-004	0.0657	4.8000e-004	0.0662	0.0174	4.5000e-004	0.0179		69.3375	69.3375	2.6200e-003		69.4029
Total	**0.0425**	**0.0312**	**0.2947**	**7.0000e-004**	**0.0657**	**4.8000e-004**	**0.0662**	**0.0174**	**4.5000e-004**	**0.0179**		**69.3375**	**69.3375**	**2.6200e-003**		**69.4029**

3.5 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4898					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**8.8221**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0584	0.0428	0.4052	9.6000e-004	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		95.3390	95.3390	3.6000e-003		95.4289
Total	**0.0584**	**0.0428**	**0.4052**	**9.6000e-004**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**95.3390**	**95.3390**	**3.6000e-003**		**95.4289**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4898					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**8.8221**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0584	0.0428	0.4052	9.6000e-004	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		95.3390	95.3390	3.6000e-003		95.4289
Total	**0.0584**	**0.0428**	**0.4052**	**9.6000e-004**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**95.3390**	**95.3390**	**3.6000e-003**		**95.4289**

3.6 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2008	12.2685	9.1549	0.0135		0.7417	0.7417		0.6832	0.6832		1,367.8311	1,367.8311	0.4114		1,378.1167
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2008**	**12.2685**	**9.1549**	**0.0135**		**0.7417**	**0.7417**		**0.6832**	**0.6832**		**1,367.8311**	**1,367.8311**	**0.4114**		**1,378.1167**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0690	0.0506	0.4788	1.1300e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		112.6734	112.6734	4.2500e-003		112.7796
Total	**0.0690**	**0.0506**	**0.4788**	**1.1300e-003**	**0.1068**	**7.9000e-004**	**0.1076**	**0.0283**	**7.3000e-004**	**0.0291**		**112.6734**	**112.6734**	**4.2500e-003**		**112.7796**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2008	12.2685	9.1549	0.0135		0.7417	0.7417		0.6832	0.6832	0.0000	1,367.8311	1,367.8311	0.4114		1,378.1167
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2008**	**12.2685**	**9.1549**	**0.0135**		**0.7417**	**0.7417**		**0.6832**	**0.6832**	**0.0000**	**1,367.8311**	**1,367.8311**	**0.4114**		**1,378.1167**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0690	0.0506	0.4788	1.1300e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		112.6734	112.6734	4.2500e-003		112.7796
Total	**0.0690**	**0.0506**	**0.4788**	**1.1300e-003**	**0.1068**	**7.9000e-004**	**0.1076**	**0.0283**	**7.3000e-004**	**0.0291**		**112.6734**	**112.6734**	**4.2500e-003**		**112.7796**

4.0 Operational Detail - Mobile

Oceanside Construction Overlay - San Diego County, Summer

Oceanside Construction Overlay

S2 - San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	65.00	Dwelling Unit	0.31	65,000.00	186
Strip Mall	30.00	1000sqft	0.69	30,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - see assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Construction Off-road Equipment Mitigation -

Architectural Coating - see assumptions

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	10.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	10.00
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	150
tblConstructionPhase	NumDays	5.00	90.00
tblConstructionPhase	PhaseEndDate	12/30/2016	10/4/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	6/6/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/13/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/17/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/7/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	6/1/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/18/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/14/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/1/2017
tblLandUse	LotAcreage	1.71	0.31
tblProjectCharacteristics	OperationalYear	2018	2019

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					

2017	12.1738	33.4381	26.6399	0.0453	4.9800	1.9930	5.8542	2.5430	1.8897	3.3473	0.0000	4,407.5662	4,407.5662	0.8945	0.0000	4,429.9295
Maximum	**12.1738**	**33.4381**	**26.6399**	**0.0453**	**4.9800**	**1.9930**	**5.8542**	**2.5430**	**1.8897**	**3.3473**	**0.0000**	**4,407.5662**	**4,407.5662**	**0.8945**	**0.0000**	**4,429.9295**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	12.1738	33.4381	26.6399	0.0453	2.1666	1.9930	3.0408	1.0971	1.8897	2.0635	0.0000	4,407.5662	4,407.5662	0.8945	0.0000	4,429.9295
Maximum	**12.1738**	**33.4381**	**26.6399**	**0.0453**	**2.1666**	**1.9930**	**3.0408**	**1.0971**	**1.8897**	**2.0635**	**0.0000**	**4,407.5662**	**4,407.5662**	**0.8945**	**0.0000**	**4,429.9295**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**56.49**	**0.00**	**48.06**	**56.86**	**0.00**	**38.36**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Building Construction	Building Construction	1/18/2017	6/6/2017	5	100	
2	Demolition	Demolition	1/1/2017	1/13/2017	5	10	
3	Grading	Grading	1/14/2017	1/17/2017	5	2	

4	Architectural Coating	Architectural Coating	6/1/2017	10/4/2017	5	90	
5	Paving	Paving	2/1/2017	2/7/2017	5	5	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0.75

Acres of Paving: 0

Residential Indoor: 131,625; Residential Outdoor: 43,875; Non-Residential Indoor: 45,000; Non-Residential Outdoor: 15,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Paving	Pavers	1	6.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	11.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	56.00	12.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	5	13.00	0.00	91.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.9653	19.2365	14.3568	0.0220		1.2313	1.2313		1.1875	1.1875		2,043.8641	2,043.8641	0.4298		2,054.6085
Total	**2.9653**	**19.2365**	**14.3568**	**0.0220**		**1.2313**	**1.2313**		**1.1875**	**1.1875**		**2,043.8641**	**2,043.8641**	**0.4298**		**2,054.6085**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0715	1.6940	0.4648	3.3600e-003	0.0812	0.0158	0.0970	0.0234	0.0151	0.0385		358.9235	358.9235	0.0297		359.6660
Worker	0.2632	0.1941	2.1616	5.2000e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		516.9429	516.9429	0.0192		517.4224
Total	**0.3347**	**1.8881**	**2.6264**	**8.5600e-003**	**0.5413**	**0.0192**	**0.5604**	**0.1454**	**0.0182**	**0.1636**		**875.8664**	**875.8664**	**0.0489**		**877.0884**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.9653	19.2365	14.3568	0.0220		1.2313	1.2313		1.1875	1.1875	0.0000	2,043.8641	2,043.8641	0.4298		2,054.6085
Total	**2.9653**	**19.2365**	**14.3568**	**0.0220**		**1.2313**	**1.2313**		**1.1875**	**1.1875**	**0.0000**	**2,043.8641**	**2,043.8641**	**0.4298**		**2,054.6085**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0715	1.6940	0.4648	3.3600e-003	0.0812	0.0158	0.0970	0.0234	0.0151	0.0385		358.9235	358.9235	0.0297		359.6660
Worker	0.2632	0.1941	2.1616	5.2000e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		516.9429	516.9429	0.0192		517.4224
Total	**0.3347**	**1.8881**	**2.6264**	**8.5600e-003**	**0.5413**	**0.0192**	**0.5604**	**0.1454**	**0.0182**	**0.1636**		**875.8664**	**875.8664**	**0.0489**		**877.0884**

3.3 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.9933	0.0000	1.9933	0.3019	0.0000	0.3019			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404		2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**1.9933**	**1.6477**	**3.6409**	**0.3019**	**1.5404**	**1.8422**		**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0980	3.1528	0.6342	7.4000e-003	0.1590	0.0178	0.1768	0.0436	0.0170	0.0606		802.7089	802.7089	0.0713		804.4911
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0611	0.0451	0.5018	1.2100e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		120.0046	120.0046	4.4500e-003		120.1159

Total	**0.1591**	**3.1979**	**1.1360**	**8.6100e-003**	**0.2658**	**0.0186**	**0.2844**	**0.0719**	**0.0178**	**0.0897**		**922.7135**	**922.7135**	**0.0757**		**924.6070**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.8521	0.0000	0.8521	0.1290	0.0000	0.1290			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404	0.0000	2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**0.8521**	**1.6477**	**2.4998**	**0.1290**	**1.5404**	**1.6694**	**0.0000**	**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0980	3.1528	0.6342	7.4000e-003	0.1590	0.0178	0.1768	0.0436	0.0170	0.0606		802.7089	802.7089	0.0713		804.4911
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0611	0.0451	0.5018	1.2100e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		120.0046	120.0046	4.4500e-003		120.1159
Total	**0.1591**	**3.1979**	**1.1360**	**8.6100e-003**	**0.2658**	**0.0186**	**0.2844**	**0.0719**	**0.0178**	**0.0897**		**922.7135**	**922.7135**	**0.0757**		**924.6070**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9143	0.0000	4.9143	2.5256	0.0000	2.5256			0.0000			0.0000
Off-Road	1.6023	18.2915	7.0342	0.0141		0.8738	0.8738		0.8039	0.8039		1,444.8958	1,444.8958	0.4427		1,455.9636
Total	**1.6023**	**18.2915**	**7.0342**	**0.0141**	**4.9143**	**0.8738**	**5.7880**	**2.5256**	**0.8039**	**3.3295**		**1,444.8958**	**1,444.8958**	**0.4427**		**1,455.9636**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0376	0.0277	0.3088	7.4000e-004	0.0657	4.8000e-004	0.0662	0.0174	4.5000e-004	0.0179		73.8490	73.8490	2.7400e-003		73.9175
Total	**0.0376**	**0.0277**	**0.3088**	**7.4000e-004**	**0.0657**	**4.8000e-004**	**0.0662**	**0.0174**	**4.5000e-004**	**0.0179**		**73.8490**	**73.8490**	**2.7400e-003**		**73.9175**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Fugitive Dust					2.1008	0.0000	2.1008	1.0797	0.0000	1.0797			0.0000			0.0000
Off-Road	1.6023	18.2915	7.0342	0.0141		0.8738	0.8738		0.8039	0.8039	0.0000	1,444.8958	1,444.8958	0.4427		1,455.9636
Total	**1.6023**	**18.2915**	**7.0342**	**0.0141**	**2.1008**	**0.8738**	**2.9746**	**1.0797**	**0.8039**	**1.8836**	**0.0000**	**1,444.8958**	**1,444.8958**	**0.4427**		**1,455.9636**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0376	0.0277	0.3088	7.4000e-004	0.0657	4.8000e-004	0.0662	0.0174	4.5000e-004	0.0179		73.8490	73.8490	2.7400e-003		73.9175
Total	**0.0376**	**0.0277**	**0.3088**	**7.4000e-004**	**0.0657**	**4.8000e-004**	**0.0662**	**0.0174**	**4.5000e-004**	**0.0179**		**73.8490**	**73.8490**	**2.7400e-003**		**73.9175**

3.5 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4898					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**8.8221**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0517	0.0381	0.4246	1.0200e-003	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		101.5424	101.5424	3.7700e-003		101.6366
Total	**0.0517**	**0.0381**	**0.4246**	**1.0200e-003**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**101.5424**	**101.5424**	**3.7700e-003**		**101.6366**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4898					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**8.8221**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0517	0.0381	0.4246	1.0200e-003	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		101.5424	101.5424	3.7700e-003		101.6366
Total	**0.0517**	**0.0381**	**0.4246**	**1.0200e-003**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**101.5424**	**101.5424**	**3.7700e-003**		**101.6366**

3.6 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2008	12.2685	9.1549	0.0135		0.7417	0.7417		0.6832	0.6832		1,367.8311	1,367.8311	0.4114		1,378.1167
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2008**	**12.2685**	**9.1549**	**0.0135**		**0.7417**	**0.7417**		**0.6832**	**0.6832**		**1,367.8311**	**1,367.8311**	**0.4114**		**1,378.1167**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0611	0.0451	0.5018	1.2100e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		120.0046	120.0046	4.4500e-003		120.1159
Total	**0.0611**	**0.0451**	**0.5018**	**1.2100e-003**	**0.1068**	**7.9000e-004**	**0.1076**	**0.0283**	**7.3000e-004**	**0.0291**		**120.0046**	**120.0046**	**4.4500e-003**		**120.1159**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.2008	12.2685	9.1549	0.0135		0.7417	0.7417		0.6832	0.6832	0.0000	1,367.8311	1,367.8311	0.4114		1,378.1167
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.2008**	**12.2685**	**9.1549**	**0.0135**		**0.7417**	**0.7417**		**0.6832**	**0.6832**	**0.0000**	**1,367.8311**	**1,367.8311**	**0.4114**		**1,378.1167**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0611	0.0451	0.5018	1.2100e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		120.0046	120.0046	4.4500e-003		120.1159
Total	**0.0611**	**0.0451**	**0.5018**	**1.2100e-003**	**0.1068**	**7.9000e-004**	**0.1076**	**0.0283**	**7.3000e-004**	**0.0291**		**120.0046**	**120.0046**	**4.4500e-003**		**120.1159**

4.0 Operational Detail - Mobile

Oceanside - Overlay - San Diego County, Annual

Oceanside - Overlay

S2 - San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	65.00	Dwelling Unit	0.31	65,000.00	186
Strip Mall	30.00	1000sqft	0.69	30,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - see assumptions

Construction Off-road Equipment Mitigation -

Architectural Coating - See Assumptions

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	10.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	10.00
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15

tblConstructionPhase	NumDays	5.00	90.00
tblConstructionPhase	PhaseEndDate	12/30/2016	10/13/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	6/13/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/13/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/17/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/24/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	6/10/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/25/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/14/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/18/2017
tblLandUse	LotAcreage	1.71	0.31
tblProjectCharacteristics	OperationalYear	2018	2019

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.5834	1.3418	1.0590	1.8700e-003	0.0362	0.0813	0.1175	0.0109	0.0783	0.0893	0.0000	162.7121	162.7121	0.0272	0.0000	163.3926
Maximum	**0.5834**	**1.3418**	**1.0590**	**1.8700e-003**	**0.0362**	**0.0813**	**0.1175**	**0.0109**	**0.0783**	**0.0893**	**0.0000**	**162.7121**	**162.7121**	**0.0272**	**0.0000**	**163.3926**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	0.5834	1.3418	1.0590	1.8700e-003	0.0334	0.0813	0.1147	9.4800e-003	0.0783	0.0878	0.0000	162.7120	162.7120	0.0272	0.0000	163.3925
Maximum	**0.5834**	**1.3418**	**1.0590**	**1.8700e-003**	**0.0334**	**0.0813**	**0.1147**	**9.4800e-003**	**0.0783**	**0.0878**	**0.0000**	**162.7120**	**162.7120**	**0.0272**	**0.0000**	**163.3925**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**7.80**	**0.00**	**2.39**	**13.19**	**0.00**	**1.61**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**1-1-2017**	**3-31-2017**	0.7774	0.7774
2	**4-1-2017**	**6-30-2017**	0.7287	0.7287
3	**7-1-2017**	**9-30-2017**	0.3646	0.3646
		Highest	0.7774	0.7774

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/13/2017	5	10	
2	Grading	Grading	1/14/2017	1/17/2017	5	2	
3	Paving	Paving	1/18/2017	1/24/2017	5	5	
4	Building Construction	Building Construction	1/25/2017	6/13/2017	5	100	
5	Architectural Coating	Architectural Coating	6/10/2017	10/13/2017	5	90	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0.75

Acres of Paving: 0

Residential Indoor: 131,625; Residential Outdoor: 43,875; Non-Residential Indoor: 45,000; Non-Residential Outdoor: 15,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	6.00	231	0.29
Building Construction	Forklifts	1	6.00	89	0.20
Paving	Pavers	1	6.00	130	0.42
Paving	Rollers	1	7.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	11.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

Building Construction	7	56.00	12.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	5	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0138	0.1338	0.0778	1.2000e-004		8.2400e-003	8.2400e-003		7.7000e-003	7.7000e-003	0.0000	10.9834	10.9834	2.7800e-003	0.0000	11.0528
Total	**0.0138**	**0.1338**	**0.0778**	**1.2000e-004**		**8.2400e-003**	**8.2400e-003**		**7.7000e-003**	**7.7000e-003**	**0.0000**	**10.9834**	**10.9834**	**2.7800e-003**	**0.0000**	**11.0528**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.1000e-004	2.5000e-004	2.3900e-003	1.0000e-005	5.2000e-004	0.0000	5.3000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.5162	0.5162	2.0000e-005	0.0000	0.5167
Total	**3.1000e-004**	**2.5000e-004**	**2.3900e-003**	**1.0000e-005**	**5.2000e-004**	**0.0000**	**5.3000e-004**	**1.4000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.5162**	**0.5162**	**2.0000e-005**	**0.0000**	**0.5167**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0138	0.1338	0.0778	1.2000e-004		8.2400e-003	8.2400e-003		7.7000e-003	7.7000e-003	0.0000	10.9834	10.9834	2.7800e-003	0.0000	11.0528
Total	**0.0138**	**0.1338**	**0.0778**	**1.2000e-004**		**8.2400e-003**	**8.2400e-003**		**7.7000e-003**	**7.7000e-003**	**0.0000**	**10.9834**	**10.9834**	**2.7800e-003**	**0.0000**	**11.0528**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Worker	3.1000e-004	2.5000e-004	2.3900e-003	1.0000e-005	5.2000e-004	0.0000	5.3000e-004	1.4000e-004	0.0000	1.4000e-004	0.0000	0.5162	0.5162	2.0000e-005	0.0000	0.5167
Total	**3.1000e-004**	**2.5000e-004**	**2.3900e-003**	**1.0000e-005**	**5.2000e-004**	**0.0000**	**5.3000e-004**	**1.4000e-004**	**0.0000**	**1.4000e-004**	**0.0000**	**0.5162**	**0.5162**	**2.0000e-005**	**0.0000**	**0.5167**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					4.9100e-003	0.0000	4.9100e-003	2.5300e-003	0.0000	2.5300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.6000e-003	0.0183	7.0300e-003	1.0000e-005		8.7000e-004	8.7000e-004		8.0000e-004	8.0000e-004	0.0000	1.3108	1.3108	4.0000e-004	0.0000	1.3208
Total	**1.6000e-003**	**0.0183**	**7.0300e-003**	**1.0000e-005**	**4.9100e-003**	**8.7000e-004**	**5.7800e-003**	**2.5300e-003**	**8.0000e-004**	**3.3300e-003**	**0.0000**	**1.3108**	**1.3108**	**4.0000e-004**	**0.0000**	**1.3208**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0000e-005	3.0000e-005	2.9000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0635	0.0635	0.0000	0.0000	0.0636
Total	**4.0000e-005**	**3.0000e-005**	**2.9000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0635**	**0.0635**	**0.0000**	**0.0000**	**0.0636**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.1000e-003	0.0000	2.1000e-003	1.0800e-003	0.0000	1.0800e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.6000e-003	0.0183	7.0300e-003	1.0000e-005		8.7000e-004	8.7000e-004		8.0000e-004	8.0000e-004	0.0000	1.3108	1.3108	4.0000e-004	0.0000	1.3208
Total	**1.6000e-003**	**0.0183**	**7.0300e-003**	**1.0000e-005**	**2.1000e-003**	**8.7000e-004**	**2.9700e-003**	**1.0800e-003**	**8.0000e-004**	**1.8800e-003**	**0.0000**	**1.3108**	**1.3108**	**4.0000e-004**	**0.0000**	**1.3208**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.0000e-005	3.0000e-005	2.9000e-004	0.0000	6.0000e-005	0.0000	6.0000e-005	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0635	0.0635	0.0000	0.0000	0.0636
Total	**4.0000e-005**	**3.0000e-005**	**2.9000e-004**	**0.0000**	**6.0000e-005**	**0.0000**	**6.0000e-005**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0635**	**0.0635**	**0.0000**	**0.0000**	**0.0636**

3.4 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	tons/yr										MT/yr					
Off-Road	3.0000e-003	0.0307	0.0229	3.0000e-005		1.8500e-003	1.8500e-003		1.7100e-003	1.7100e-003	0.0000	3.1022	3.1022	9.3000e-004	0.0000	3.1255
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**3.0000e-003**	**0.0307**	**0.0229**	**3.0000e-005**		**1.8500e-003**	**1.8500e-003**		**1.7100e-003**	**1.7100e-003**	**0.0000**	**3.1022**	**3.1022**	**9.3000e-004**	**0.0000**	**3.1255**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.2000e-004	1.1900e-003	0.0000	2.6000e-004	0.0000	2.6000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.2581	0.2581	1.0000e-005	0.0000	0.2583
Total	**1.5000e-004**	**1.2000e-004**	**1.1900e-003**	**0.0000**	**2.6000e-004**	**0.0000**	**2.6000e-004**	**7.0000e-005**	**0.0000**	**7.0000e-005**	**0.0000**	**0.2581**	**0.2581**	**1.0000e-005**	**0.0000**	**0.2583**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	3.0000e-003	0.0307	0.0229	3.0000e-005		1.8500e-003	1.8500e-003		1.7100e-003	1.7100e-003	0.0000	3.1022	3.1022	9.3000e-004	0.0000	3.1255
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Total	**3.0000e-003**	**0.0307**	**0.0229**	**3.0000e-005**		**1.8500e-003**	**1.8500e-003**		**1.7100e-003**	**1.7100e-003**	**0.0000**	**3.1022**	**3.1022**	**9.3000e-004**	**0.0000**	**3.1255**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.5000e-004	1.2000e-004	1.1900e-003	0.0000	2.6000e-004	0.0000	2.6000e-004	7.0000e-005	0.0000	7.0000e-005	0.0000	0.2581	0.2581	1.0000e-005	0.0000	0.2583
Total	**1.5000e-004**	**1.2000e-004**	**1.1900e-003**	**0.0000**	**2.6000e-004**	**0.0000**	**2.6000e-004**	**7.0000e-005**	**0.0000**	**7.0000e-005**	**0.0000**	**0.2581**	**0.2581**	**1.0000e-005**	**0.0000**	**0.2583**

3.5 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1483	0.9618	0.7178	1.1000e-003		0.0616	0.0616		0.0594	0.0594	0.0000	92.7081	92.7081	0.0195	0.0000	93.1955
Total	**0.1483**	**0.9618**	**0.7178**	**1.1000e-003**		**0.0616**	**0.0616**		**0.0594**	**0.0594**	**0.0000**	**92.7081**	**92.7081**	**0.0195**	**0.0000**	**93.1955**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.6300e-003	0.0859	0.0244	1.7000e-004	3.9800e-003	7.9000e-004	4.7800e-003	1.1500e-003	7.6000e-004	1.9100e-003	0.0000	16.1143	16.1143	1.3900e-003	0.0000	16.1489
Worker	0.0132	0.0107	0.1029	2.5000e-004	0.0225	1.7000e-004	0.0226	5.9700e-003	1.6000e-004	6.1200e-003	0.0000	22.2351	22.2351	8.3000e-004	0.0000	22.2560
Total	**0.0169**	**0.0966**	**0.1273**	**4.2000e-004**	**0.0264**	**9.6000e-004**	**0.0274**	**7.1200e-003**	**9.2000e-004**	**8.0300e-003**	**0.0000**	**38.3494**	**38.3494**	**2.2200e-003**	**0.0000**	**38.4049**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1483	0.9618	0.7178	1.1000e-003		0.0616	0.0616		0.0594	0.0594	0.0000	92.7080	92.7080	0.0195	0.0000	93.1954
Total	**0.1483**	**0.9618**	**0.7178**	**1.1000e-003**		**0.0616**	**0.0616**		**0.0594**	**0.0594**	**0.0000**	**92.7080**	**92.7080**	**0.0195**	**0.0000**	**93.1954**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.6300e-003	0.0859	0.0244	1.7000e-004	3.9800e-003	7.9000e-004	4.7800e-003	1.1500e-003	7.6000e-004	1.9100e-003	0.0000	16.1143	16.1143	1.3900e-003	0.0000	16.1489
Worker	0.0132	0.0107	0.1029	2.5000e-004	0.0225	1.7000e-004	0.0226	5.9700e-003	1.6000e-004	6.1200e-003	0.0000	22.2351	22.2351	8.3000e-004	0.0000	22.2560
Total	**0.0169**	**0.0966**	**0.1273**	**4.2000e-004**	**0.0264**	**9.6000e-004**	**0.0274**	**7.1200e-003**	**9.2000e-004**	**8.0300e-003**	**0.0000**	**38.3494**	**38.3494**	**2.2200e-003**	**0.0000**	**38.4049**

3.6 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3820					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0150	0.0983	0.0841	1.3000e-004		7.8000e-003	7.8000e-003		7.8000e-003	7.8000e-003	0.0000	11.4896	11.4896	1.2100e-003	0.0000	11.5200
Total	**0.3970**	**0.0983**	**0.0841**	**1.3000e-004**		**7.8000e-003**	**7.8000e-003**		**7.8000e-003**	**7.8000e-003**	**0.0000**	**11.4896**	**11.4896**	**1.2100e-003**	**0.0000**	**11.5200**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3400e-003	1.8900e-003	0.0182	4.0000e-005	3.9700e-003	3.0000e-005	4.0000e-003	1.0500e-003	3.0000e-005	1.0800e-003	0.0000	3.9309	3.9309	1.5000e-004	0.0000	3.9345

Total	**2.3400e-003**	**1.8900e-003**	**0.0182**	**4.0000e-005**	**3.9700e-003**	**3.0000e-005**	**4.0000e-003**	**1.0500e-003**	**3.0000e-005**	**1.0800e-003**	**0.0000**	**3.9309**	**3.9309**	**1.5000e-004**	**0.0000**	**3.9345**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3820					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0150	0.0983	0.0841	1.3000e-004		7.8000e-003	7.8000e-003		7.8000e-003	7.8000e-003	0.0000	11.4896	11.4896	1.2100e-003	0.0000	11.5200
Total	**0.3970**	**0.0983**	**0.0841**	**1.3000e-004**		**7.8000e-003**	**7.8000e-003**		**7.8000e-003**	**7.8000e-003**	**0.0000**	**11.4896**	**11.4896**	**1.2100e-003**	**0.0000**	**11.5200**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.3400e-003	1.8900e-003	0.0182	4.0000e-005	3.9700e-003	3.0000e-005	4.0000e-003	1.0500e-003	3.0000e-005	1.0800e-003	0.0000	3.9309	3.9309	1.5000e-004	0.0000	3.9345
Total	**2.3400e-003**	**1.8900e-003**	**0.0182**	**4.0000e-005**	**3.9700e-003**	**3.0000e-005**	**4.0000e-003**	**1.0500e-003**	**3.0000e-005**	**1.0800e-003**	**0.0000**	**3.9309**	**3.9309**	**1.5000e-004**	**0.0000**	**3.9345**

4.0 Operational Detail - Mobile

Construction
Scenario 3
CalEEMod

Oceanside Construction Overlay - San Diego County, Winter

Oceanside Construction Overlay

S3 - San Diego County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	65.00	Dwelling Unit	4.31	65,000.00	186
Strip Mall	30.00	1000sqft	0.69	30,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - see assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Construction Off-road Equipment Mitigation -

Architectural Coating - see assumptions

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	10.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	10.00
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	150
tblConstructionPhase	NumDays	18.00	90.00
tblConstructionPhase	PhaseEndDate	10/17/2017	12/28/2017
tblConstructionPhase	PhaseEndDate	6/6/2017	12/27/2017
tblConstructionPhase	PhaseEndDate	1/13/2017	1/27/2017
tblConstructionPhase	PhaseEndDate	1/17/2017	2/8/2017
tblConstructionPhase	PhaseEndDate	6/13/2017	3/6/2017
tblConstructionPhase	PhaseStartDate	6/14/2017	8/25/2017
tblConstructionPhase	PhaseStartDate	1/18/2017	2/9/2017
tblConstructionPhase	PhaseStartDate	1/14/2017	1/28/2017
tblConstructionPhase	PhaseStartDate	6/7/2017	2/9/2017
tblLandUse	LotAcreage	1.71	4.31
tblProjectCharacteristics	OperationalYear	2018	2019

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					

2017	12.3669	49.2481	36.3423	0.0592	6.6756	2.9674	8.4539	3.4002	2.7649	5.0362	0.0000	5,947.1937	5,947.1937	1.4221	0.0000	5,982.7450
Maximum	**12.3669**	**49.2481**	**36.3423**	**0.0592**	**6.6756**	**2.9674**	**8.4539**	**3.4002**	**2.7649**	**5.0362**	**0.0000**	**5,947.1937**	**5,947.1937**	**1.4221**	**0.0000**	**5,982.7450**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	12.3669	49.2481	36.3423	0.0592	2.9243	2.9674	4.7027	1.4723	2.7649	3.1084	0.0000	5,947.1937	5,947.1937	1.4221	0.0000	5,982.7450
Maximum	**12.3669**	**49.2481**	**36.3423**	**0.0592**	**2.9243**	**2.9674**	**4.7027**	**1.4723**	**2.7649**	**3.1084**	**0.0000**	**5,947.1937**	**5,947.1937**	**1.4221**	**0.0000**	**5,982.7450**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**56.19**	**0.00**	**44.37**	**56.70**	**0.00**	**38.28**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/27/2017	5	20	
2	Grading	Grading	1/28/2017	2/8/2017	5	8	
3	Building Construction	Building Construction	2/9/2017	12/27/2017	5	230	
4	Paving	Paving	2/9/2017	3/6/2017	5	18	

5	Architectural Coating	Architectural Coating	8/25/2017	12/28/2017	5	90	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 131,625; Residential Outdoor: 43,875; Non-Residential Indoor: 45,000; Non-Residential Outdoor: 15,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Grading	Excavators	1	8.00	158	0.38
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Paving	Paving Equipment	2	8.00	132	0.36
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	11.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

Building Construction	9	56.00	12.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	6	15.00	0.00	91.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.9966	0.0000	0.9966	0.1509	0.0000	0.1509			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425		3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**0.9966**	**2.1935**	**3.1901**	**0.1509**	**2.0425**	**2.1934**		**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day										lb/day					
Hauling	0.0503	1.5953	0.3412	3.6400e-003	0.0795	9.0600e-003	0.0886	0.0218	8.6600e-003	0.0305		394.9496	394.9496	0.0370		395.8751
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.1299**	**1.6537**	**0.8936**	**4.9500e-003**	**0.2027**	**9.9700e-003**	**0.2127**	**0.0545**	**9.5000e-003**	**0.0640**		**524.9573**	**524.9573**	**0.0419**		**526.0055**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.4261	0.0000	0.4261	0.0645	0.0000	0.0645			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425	0.0000	3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**0.4261**	**2.1935**	**2.6195**	**0.0645**	**2.0425**	**2.1070**	**0.0000**	**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0503	1.5953	0.3412	3.6400e-003	0.0795	9.0600e-003	0.0886	0.0218	8.6600e-003	0.0305		394.9496	394.9496	0.0370		395.8751
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.1299**	**1.6537**	**0.8936**	**4.9500e-003**	**0.2027**	**9.9700e-003**	**0.2127**	**0.0545**	**9.5000e-003**	**0.0640**		**524.9573**	**524.9573**	**0.0419**		**526.0055**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352		3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**6.5523**	**1.7774**	**8.3298**	**3.3675**	**1.6352**	**5.0027**		**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.8011	0.0000	2.8011	1.4396	0.0000	1.4396			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352	0.0000	3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**2.8011**	**1.7774**	**4.5786**	**1.4396**	**1.6352**	**3.0748**	**0.0000**	**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791		2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**		**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0744	1.6993	0.5128	3.2800e-003	0.0812	0.0160	0.0973	0.0234	0.0153	0.0387		350.1979	350.1979	0.0316		350.9882
Worker	0.2972	0.2180	2.0626	4.8800e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		485.3622	485.3622	0.0183		485.8199
Total	**0.3716**	**1.9173**	**2.5754**	**8.1600e-003**	**0.5413**	**0.0194**	**0.5607**	**0.1454**	**0.0185**	**0.1639**		**835.5601**	**835.5601**	**0.0499**		**836.8081**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791	0.0000	2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**	**0.0000**	**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0744	1.6993	0.5128	3.2800e-003	0.0812	0.0160	0.0973	0.0234	0.0153	0.0387		350.1979	350.1979	0.0316		350.9882
Worker	0.2972	0.2180	2.0626	4.8800e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		485.3622	485.3622	0.0183		485.8199
Total	**0.3716**	**1.9173**	**2.5754**	**8.1600e-003**	**0.5413**	**0.0194**	**0.5607**	**0.1454**	**0.0185**	**0.1639**		**835.5601**	**835.5601**	**0.0499**		**836.8081**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665		2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**		**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665	0.0000	2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**	**0.0000**	**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

3.6 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4898					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**8.8221**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0584	0.0428	0.4052	9.6000e-004	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		95.3390	95.3390	3.6000e-003		95.4289

Total	**0.0584**	**0.0428**	**0.4052**	**9.6000e-004**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**95.3390**	**95.3390**	**3.6000e-003**		**95.4289**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4898					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**8.8221**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0584	0.0428	0.4052	9.6000e-004	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		95.3390	95.3390	3.6000e-003		95.4289
Total	**0.0584**	**0.0428**	**0.4052**	**9.6000e-004**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**95.3390**	**95.3390**	**3.6000e-003**		**95.4289**

4.0 Operational Detail - Mobile

Oceanside Construction Overlay

S3 - San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	65.00	Dwelling Unit	4.31	65,000.00	186
Strip Mall	30.00	1000sqft	0.69	30,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - see assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Construction Off-road Equipment Mitigation -

Architectural Coating - see assumptions

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	10.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	10.00
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	150
tblConstructionPhase	NumDays	18.00	90.00
tblConstructionPhase	PhaseEndDate	10/17/2017	12/28/2017
tblConstructionPhase	PhaseEndDate	6/6/2017	12/27/2017
tblConstructionPhase	PhaseEndDate	1/13/2017	1/27/2017
tblConstructionPhase	PhaseEndDate	1/17/2017	2/8/2017
tblConstructionPhase	PhaseEndDate	6/13/2017	3/6/2017
tblConstructionPhase	PhaseStartDate	6/14/2017	8/25/2017
tblConstructionPhase	PhaseStartDate	1/18/2017	2/9/2017
tblConstructionPhase	PhaseStartDate	1/14/2017	1/28/2017
tblConstructionPhase	PhaseStartDate	6/7/2017	2/9/2017
tblLandUse	LotAcreage	1.71	4.31
tblProjectCharacteristics	OperationalYear	2018	2019

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					

2017	12.3234	49.2125	36.4199	0.0597	6.6756	2.9672	8.4539	3.4002	2.7646	5.0362	0.0000	5,995.9591	5,995.9591	1.4213	0.0000	6,031.4903
Maximum	**12.3234**	**49.2125**	**36.4199**	**0.0597**	**6.6756**	**2.9672**	**8.4539**	**3.4002**	**2.7646**	**5.0362**	**0.0000**	**5,995.9591**	**5,995.9591**	**1.4213**	**0.0000**	**6,031.4903**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	12.3234	49.2125	36.4199	0.0597	2.9243	2.9672	4.7027	1.4723	2.7646	3.1084	0.0000	5,995.9591	5,995.9591	1.4213	0.0000	6,031.4903
Maximum	**12.3234**	**49.2125**	**36.4199**	**0.0597**	**2.9243**	**2.9672**	**4.7027**	**1.4723**	**2.7646**	**3.1084**	**0.0000**	**5,995.9591**	**5,995.9591**	**1.4213**	**0.0000**	**6,031.4903**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**56.19**	**0.00**	**44.37**	**56.70**	**0.00**	**38.28**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/27/2017	5	20	
2	Grading	Grading	1/28/2017	2/8/2017	5	8	
3	Building Construction	Building Construction	2/9/2017	12/27/2017	5	230	

4	Paving	Paving	2/9/2017	3/6/2017	5	18	
5	Architectural Coating	Architectural Coating	8/25/2017	12/28/2017	5	90	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 131,625; Residential Outdoor: 43,875; Non-Residential Indoor: 45,000; Non-Residential Outdoor: 15,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Grading	Excavators	1	8.00	158	0.38
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Paving	Paving Equipment	2	8.00	132	0.36
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class

Architectural Coating	1	11.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	56.00	12.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	6	15.00	0.00	91.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.9966	0.0000	0.9966	0.1509	0.0000	0.1509			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425		3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**0.9966**	**2.1935**	**3.1901**	**0.1509**	**2.0425**	**2.1934**		**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day										lb/day					
Hauling	0.0490	1.5764	0.3171	3.7000e-003	0.0795	8.8900e-003	0.0884	0.0218	8.5100e-003	0.0303		401.3544	401.3544	0.0356		402.2456
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.1195**	**1.6284**	**0.8961**	**5.0900e-003**	**0.2027**	**9.8000e-003**	**0.2125**	**0.0545**	**9.3500e-003**	**0.0638**		**539.8213**	**539.8213**	**0.0408**		**540.8409**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.4261	0.0000	0.4261	0.0645	0.0000	0.0645			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425	0.0000	3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**0.4261**	**2.1935**	**2.6195**	**0.0645**	**2.0425**	**2.1070**	**0.0000**	**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0490	1.5764	0.3171	3.7000e-003	0.0795	8.8900e-003	0.0884	0.0218	8.5100e-003	0.0303		401.3544	401.3544	0.0356		402.2456
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.1195**	**1.6284**	**0.8961**	**5.0900e-003**	**0.2027**	**9.8000e-003**	**0.2125**	**0.0545**	**9.3500e-003**	**0.0638**		**539.8213**	**539.8213**	**0.0408**		**540.8409**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352		3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**6.5523**	**1.7774**	**8.3298**	**3.3675**	**1.6352**	**5.0027**		**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.8011	0.0000	2.8011	1.4396	0.0000	1.4396			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352	0.0000	3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**2.8011**	**1.7774**	**4.5786**	**1.4396**	**1.6352**	**3.0748**	**0.0000**	**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791		2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**		**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0715	1.6940	0.4648	3.3600e-003	0.0812	0.0158	0.0970	0.0234	0.0151	0.0385		358.9235	358.9235	0.0297		359.6660
Worker	0.2632	0.1941	2.1616	5.2000e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		516.9429	516.9429	0.0192		517.4224
Total	**0.3347**	**1.8881**	**2.6264**	**8.5600e-003**	**0.5413**	**0.0192**	**0.5604**	**0.1454**	**0.0182**	**0.1636**		**875.8664**	**875.8664**	**0.0489**		**877.0884**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791	0.0000	2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**	**0.0000**	**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0715	1.6940	0.4648	3.3600e-003	0.0812	0.0158	0.0970	0.0234	0.0151	0.0385		358.9235	358.9235	0.0297		359.6660
Worker	0.2632	0.1941	2.1616	5.2000e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		516.9429	516.9429	0.0192		517.4224
Total	**0.3347**	**1.8881**	**2.6264**	**8.5600e-003**	**0.5413**	**0.0192**	**0.5604**	**0.1454**	**0.0182**	**0.1636**		**875.8664**	**875.8664**	**0.0489**		**877.0884**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665		2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**		**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665	0.0000	2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**	**0.0000**	**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

3.6 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4898					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**8.8221**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0517	0.0381	0.4246	1.0200e-003	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		101.5424	101.5424	3.7700e-003		101.6366

Total	**0.0517**	**0.0381**	**0.4246**	**1.0200e-003**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**101.5424**	**101.5424**	**3.7700e-003**		**101.6366**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	8.4898					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**8.8221**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0517	0.0381	0.4246	1.0200e-003	0.0904	6.7000e-004	0.0910	0.0240	6.1000e-004	0.0246		101.5424	101.5424	3.7700e-003		101.6366
Total	**0.0517**	**0.0381**	**0.4246**	**1.0200e-003**	**0.0904**	**6.7000e-004**	**0.0910**	**0.0240**	**6.1000e-004**	**0.0246**		**101.5424**	**101.5424**	**3.7700e-003**		**101.6366**

4.0 Operational Detail - Mobile

Construction
Scenario 4
CalEEMod

Oceanside Construction - 5 acre full

S4 - San Diego County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	325.00	Dwelling Unit	2.50	325,000.00	930
Strip Mall	150.00	1000sqft	2.50	150,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2024
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - See Assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Construction Off-road Equipment Mitigation -

Architectural Coating -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	18.00	180.00
tblConstructionPhase	PhaseEndDate	12/30/2016	12/27/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/27/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/8/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	3/6/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/9/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/28/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/9/2017
tblLandUse	LotAcreage	8.55	2.50
tblLandUse	LotAcreage	3.44	2.50
tblProjectCharacteristics	OperationalYear	2018	2024

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	81.4082	56.7834	46.6746	0.0917	6.6756	3.0439	8.4539	3.4002	2.8376	5.0362	0.0000	9,277.5854	9,277.5854	1.6198	0.0000	9,318.0792
Maximum	**81.4082**	**56.7834**	**46.6746**	**0.0917**	**6.6756**	**3.0439**	**8.4539**	**3.4002**	**2.8376**	**5.0362**	**0.0000**	**9,277.5854**	**9,277.5854**	**1.6198**	**0.0000**	**9,318.0792**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	81.4082	56.7834	46.6746	0.0917	3.1760	3.0439	5.8831	1.4723	2.8376	3.5997	0.0000	9,277.5854	9,277.5854	1.6198	0.0000	9,318.0792
Maximum	**81.4082**	**56.7834**	**46.6746**	**0.0917**	**3.1760**	**3.0439**	**5.8831**	**1.4723**	**2.8376**	**3.5997**	**0.0000**	**9,277.5854**	**9,277.5854**	**1.6198**	**0.0000**	**9,318.0792**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**52.42**	**0.00**	**30.41**	**56.70**	**0.00**	**28.52**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/27/2017	5	20	
2	Grading	Grading	1/28/2017	2/8/2017	5	8	
3	Building Construction	Building Construction	2/9/2017	12/27/2017	5	230	
4	Paving	Paving	2/9/2017	3/6/2017	5	18	
5	architectural coating	Architectural Coating	4/1/2017	12/8/2017	5	180	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 658,125; Residential Outdoor: 219,375; Non-Residential Indoor: 225,000; Non-Residential Outdoor: 75,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
architectural coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
architectural coating	1	56.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	282.00	59.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	6	15.00	0.00	455.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9832	0.0000	4.9832	0.7546	0.0000	0.7546			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425		3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**4.9832**	**2.1935**	**7.1766**	**0.7546**	**2.0425**	**2.7971**		**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2515	7.9766	1.7058	0.0182	0.3975	0.0453	0.4428	0.1090	0.0433	0.1523		1,974.7479	1,974.7479	0.1851		1,979.3756

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.3311**	**8.0350**	**2.2583**	**0.0195**	**0.5208**	**0.0462**	**0.5670**	**0.1416**	**0.0442**	**0.1858**		**2,104.7557**	**2,104.7557**	**0.1900**		**2,109.5059**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.1303	0.0000	2.1303	0.3226	0.0000	0.3226			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425	0.0000	3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**2.1303**	**2.1935**	**4.3238**	**0.3226**	**2.0425**	**2.3651**	**0.0000**	**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2515	7.9766	1.7058	0.0182	0.3975	0.0453	0.4428	0.1090	0.0433	0.1523		1,974.7479	1,974.7479	0.1851		1,979.3756
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.3311**	**8.0350**	**2.2583**	**0.0195**	**0.5208**	**0.0462**	**0.5670**	**0.1416**	**0.0442**	**0.1858**		**2,104.7557**	**2,104.7557**	**0.1900**		**2,109.5059**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352		3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**6.5523**	**1.7774**	**8.3298**	**3.3675**	**1.6352**	**5.0027**		**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.8011	0.0000	2.8011	1.4396	0.0000	1.4396			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352	0.0000	3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**2.8011**	**1.7774**	**4.5786**	**1.4396**	**1.6352**	**3.0748**	**0.0000**	**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791		2,650.9797	2,650.9797	0.6531		2,667.3078

Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**		**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3659	8.3546	2.5212	0.0161	0.3994	0.0788	0.4783	0.1150	0.0754	0.1904		1,721.8063	1,721.8063	0.1554		1,725.6919
Worker	1.4964	1.0979	10.3865	0.0246	2.3166	0.0171	2.3336	0.6145	0.0158	0.6302		2,444.1455	2,444.1455	0.0922		2,446.4503
Total	**1.8622**	**9.4526**	**12.9077**	**0.0407**	**2.7160**	**0.0959**	**2.8119**	**0.7294**	**0.0912**	**0.8206**		**4,165.9518**	**4,165.9518**	**0.2476**		**4,172.1423**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791	0.0000	2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**	**0.0000**	**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3659	8.3546	2.5212	0.0161	0.3994	0.0788	0.4783	0.1150	0.0754	0.1904		1,721.8063	1,721.8063	0.1554		1,725.6919
Worker	1.4964	1.0979	10.3865	0.0246	2.3166	0.0171	2.3336	0.6145	0.0158	0.6302		2,444.1455	2,444.1455	0.0922		2,446.4503
Total	**1.8622**	**9.4526**	**12.9077**	**0.0407**	**2.7160**	**0.0959**	**2.8119**	**0.7294**	**0.0912**	**0.8206**		**4,165.9518**	**4,165.9518**	**0.2476**		**4,172.1423**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665		2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**		**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day											lb/day				
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665	0.0000	2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**	**0.0000**	**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

3.6 architectural coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	75.8016					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**76.1339**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2972	0.2180	2.0626	4.8800e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		485.3622	485.3622	0.0183		485.8199
Total	**0.2972**	**0.2180**	**2.0626**	**4.8800e-003**	**0.4600**	**3.3900e-003**	**0.4634**	**0.1220**	**3.1300e-003**	**0.1252**		**485.3622**	**485.3622**	**0.0183**		**485.8199**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	75.8016					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**76.1339**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2972	0.2180	2.0626	4.8800e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		485.3622	485.3622	0.0183		485.8199
Total	**0.2972**	**0.2180**	**2.0626**	**4.8800e-003**	**0.4600**	**3.3900e-003**	**0.4634**	**0.1220**	**3.1300e-003**	**0.1252**		**485.3622**	**485.3622**	**0.0183**		**485.8199**

4.0 Operational Detail - Mobile

Oceanside Construction - 5 acre full

S5 - San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	325.00	Dwelling Unit	2.50	325,000.00	930
Strip Mall	150.00	1000sqft	2.50	150,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2024
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - See Assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Construction Off-road Equipment Mitigation -

Architectural Coating -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	18.00	180.00
tblConstructionPhase	PhaseEndDate	12/30/2016	12/27/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/27/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/8/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	3/6/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/9/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/28/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/9/2017
tblLandUse	LotAcreage	8.55	2.50
tblLandUse	LotAcreage	3.44	2.50
tblProjectCharacteristics	OperationalYear	2018	2024

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	81.1888	56.6308	46.9641	0.0938	6.6756	3.0427	8.4539	3.4002	2.8364	5.0362	0.0000	9,487.9767	9,487.9767	1.6150	0.0000	9,528.3511
Maximum	**81.1888**	**56.6308**	**46.9641**	**0.0938**	**6.6756**	**3.0427**	**8.4539**	**3.4002**	**2.8364**	**5.0362**	**0.0000**	**9,487.9767**	**9,487.9767**	**1.6150**	**0.0000**	**9,528.3511**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	81.1888	56.6308	46.9641	0.0938	3.1760	3.0427	5.8819	1.4723	2.8364	3.5985	0.0000	9,487.9767	9,487.9767	1.6150	0.0000	9,528.3511
Maximum	**81.1888**	**56.6308**	**46.9641**	**0.0938**	**3.1760**	**3.0427**	**5.8819**	**1.4723**	**2.8364**	**3.5985**	**0.0000**	**9,487.9767**	**9,487.9767**	**1.6150**	**0.0000**	**9,528.3511**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**52.42**	**0.00**	**30.42**	**56.70**	**0.00**	**28.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/27/2017	5	20	
2	Grading	Grading	1/28/2017	2/8/2017	5	8	
3	Building Construction	Building Construction	2/9/2017	12/27/2017	5	230	
4	Paving	Paving	2/9/2017	3/6/2017	5	18	
5	architectural coating	Architectural Coating	4/1/2017	12/8/2017	5	180	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 658,125; Residential Outdoor: 219,375; Non-Residential Indoor: 225,000; Non-Residential Outdoor: 75,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
architectural coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
architectural coating	1	56.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	282.00	59.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	6	15.00	0.00	455.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9832	0.0000	4.9832	0.7546	0.0000	0.7546			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425		3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**4.9832**	**2.1935**	**7.1766**	**0.7546**	**2.0425**	**2.7971**		**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2450	7.8821	1.5855	0.0185	0.3975	0.0445	0.4420	0.1090	0.0425	0.1515		2,006.7722	2,006.7722	0.1782		2,011.2278

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.3155**	**7.9341**	**2.1645**	**0.0199**	**0.5208**	**0.0454**	**0.5661**	**0.1416**	**0.0434**	**0.1850**		**2,145.2390**	**2,145.2390**	**0.1834**		**2,149.8231**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.1303	0.0000	2.1303	0.3226	0.0000	0.3226			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425	0.0000	3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**2.1303**	**2.1935**	**4.3238**	**0.3226**	**2.0425**	**2.3651**	**0.0000**	**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2450	7.8821	1.5855	0.0185	0.3975	0.0445	0.4420	0.1090	0.0425	0.1515		2,006.7722	2,006.7722	0.1782		2,011.2278
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.3155**	**7.9341**	**2.1645**	**0.0199**	**0.5208**	**0.0454**	**0.5661**	**0.1416**	**0.0434**	**0.1850**		**2,145.2390**	**2,145.2390**	**0.1834**		**2,149.8231**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352		3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**6.5523**	**1.7774**	**8.3298**	**3.3675**	**1.6352**	**5.0027**		**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.8011	0.0000	2.8011	1.4396	0.0000	1.4396			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352	0.0000	3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**2.8011**	**1.7774**	**4.5786**	**1.4396**	**1.6352**	**3.0748**	**0.0000**	**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791		2,650.9797	2,650.9797	0.6531		2,667.3078

Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**		**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3515	8.3287	2.2855	0.0165	0.3994	0.0776	0.4770	0.1150	0.0743	0.1892		1,764.7073	1,764.7073	0.1460		1,768.3577
Worker	1.3253	0.9777	10.8852	0.0262	2.3166	0.0171	2.3336	0.6145	0.0158	0.6302		2,603.1767	2,603.1767	0.0966		2,605.5916
Total	**1.6769**	**9.3064**	**13.1706**	**0.0427**	**2.7160**	**0.0947**	**2.8107**	**0.7294**	**0.0900**	**0.8195**		**4,367.8840**	**4,367.8840**	**0.2426**		**4,373.9492**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791	0.0000	2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**	**0.0000**	**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3515	8.3287	2.2855	0.0165	0.3994	0.0776	0.4770	0.1150	0.0743	0.1892		1,764.7073	1,764.7073	0.1460		1,768.3577
Worker	1.3253	0.9777	10.8852	0.0262	2.3166	0.0171	2.3336	0.6145	0.0158	0.6302		2,603.1767	2,603.1767	0.0966		2,605.5916
Total	**1.6769**	**9.3064**	**13.1706**	**0.0427**	**2.7160**	**0.0947**	**2.8107**	**0.7294**	**0.0900**	**0.8195**		**4,367.8840**	**4,367.8840**	**0.2426**		**4,373.9492**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665		2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**		**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e

Category	lb/day											lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665	0.0000	2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**	**0.0000**	**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

3.6 architectural coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	75.8016					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**76.1339**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2632	0.1941	2.1616	5.2000e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		516.9429	516.9429	0.0192		517.4224
Total	**0.2632**	**0.1941**	**2.1616**	**5.2000e-003**	**0.4600**	**3.3900e-003**	**0.4634**	**0.1220**	**3.1300e-003**	**0.1252**		**516.9429**	**516.9429**	**0.0192**		**517.4224**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	75.8016					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**76.1339**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2632	0.1941	2.1616	5.2000e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		516.9429	516.9429	0.0192		517.4224
Total	**0.2632**	**0.1941**	**2.1616**	**5.2000e-003**	**0.4600**	**3.3900e-003**	**0.4634**	**0.1220**	**3.1300e-003**	**0.1252**		**516.9429**	**516.9429**	**0.0192**		**517.4224**

4.0 Operational Detail - Mobile

Construction
Scenario 5
CalEEMod

Oceanside Construction - 5 acre full

S5 - San Diego County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	325.00	Dwelling Unit	2.50	325,000.00	930
Strip Mall	150.00	1000sqft	2.50	150,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2024
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - See Assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Construction Off-road Equipment Mitigation -

Architectural Coating - see assumptions

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	10.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	10.00
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	18.00	180.00
tblConstructionPhase	PhaseEndDate	12/30/2016	12/27/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/27/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/8/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	3/6/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/9/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/28/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/9/2017
tblLandUse	LotAcreage	8.55	2.50
tblLandUse	LotAcreage	3.44	2.50
tblProjectCharacteristics	OperationalYear	2018	2024

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	26.8311	56.7834	46.6746	0.0917	6.6756	3.0439	8.4539	3.4002	2.8376	5.0362	0.0000	9,277.5854	9,277.5854	1.6198	0.0000	9,318.0792

Maximum	**26.8311**	**56.7834**	**46.6746**	**0.0917**	**6.6756**	**3.0439**	**8.4539**	**3.4002**	**2.8376**	**5.0362**	**0.0000**	**9,277.5854**	**9,277.5854**	**1.6198**	**0.0000**	**9,318.0792**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	26.8311	56.7834	46.6746	0.0917	3.1760	3.0439	5.8831	1.4723	2.8376	3.5997	0.0000	9,277.5854	9,277.5854	1.6198	0.0000	9,318.0792
Maximum	**26.8311**	**56.7834**	**46.6746**	**0.0917**	**3.1760**	**3.0439**	**5.8831**	**1.4723**	**2.8376**	**3.5997**	**0.0000**	**9,277.5854**	**9,277.5854**	**1.6198**	**0.0000**	**9,318.0792**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**52.42**	**0.00**	**30.41**	**56.70**	**0.00**	**28.52**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/27/2017	5	20	
2	Grading	Grading	1/28/2017	2/8/2017	5	8	
3	Building Construction	Building Construction	2/9/2017	12/27/2017	5	230	
4	Paving	Paving	2/9/2017	3/6/2017	5	18	
5	architectural coating	Architectural Coating	4/1/2017	12/8/2017	5	180	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 658,125; Residential Outdoor: 219,375; Non-Residential Indoor: 225,000; Non-Residential Outdoor: 75,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
architectural coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
architectural coating	1	56.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	282.00	59.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

Demolition	6	15.00	0.00	455.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9832	0.0000	4.9832	0.7546	0.0000	0.7546			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425		3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**4.9832**	**2.1935**	**7.1766**	**0.7546**	**2.0425**	**2.7971**		**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.2515	7.9766	1.7058	0.0182	0.3975	0.0453	0.4428	0.1090	0.0433	0.1523		1,974.7479	1,974.7479	0.1851		1,979.3756
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.3311**	**8.0350**	**2.2583**	**0.0195**	**0.5208**	**0.0462**	**0.5670**	**0.1416**	**0.0442**	**0.1858**		**2,104.7557**	**2,104.7557**	**0.1900**		**2,109.5059**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.1303	0.0000	2.1303	0.3226	0.0000	0.3226			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425	0.0000	3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**2.1303**	**2.1935**	**4.3238**	**0.3226**	**2.0425**	**2.3651**	**0.0000**	**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2515	7.9766	1.7058	0.0182	0.3975	0.0453	0.4428	0.1090	0.0433	0.1523		1,974.7479	1,974.7479	0.1851		1,979.3756
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303

Total	**0.3311**	**8.0350**	**2.2583**	**0.0195**	**0.5208**	**0.0462**	**0.5670**	**0.1416**	**0.0442**	**0.1858**		**2,104.7557**	**2,104.7557**	**0.1900**		**2,109.5059**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352		3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**6.5523**	**1.7774**	**8.3298**	**3.3675**	**1.6352**	**5.0027**		**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.8011	0.0000	2.8011	1.4396	0.0000	1.4396			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352	0.0000	3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**2.8011**	**1.7774**	**4.5786**	**1.4396**	**1.6352**	**3.0748**	**0.0000**	**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791		2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**		**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3659	8.3546	2.5212	0.0161	0.3994	0.0788	0.4783	0.1150	0.0754	0.1904		1,721.8063	1,721.8063	0.1554		1,725.6919
Worker	1.4964	1.0979	10.3865	0.0246	2.3166	0.0171	2.3336	0.6145	0.0158	0.6302		2,444.1455	2,444.1455	0.0922		2,446.4503
Total	**1.8622**	**9.4526**	**12.9077**	**0.0407**	**2.7160**	**0.0959**	**2.8119**	**0.7294**	**0.0912**	**0.8206**		**4,165.9518**	**4,165.9518**	**0.2476**		**4,172.1423**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791	0.0000	2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**	**0.0000**	**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3659	8.3546	2.5212	0.0161	0.3994	0.0788	0.4783	0.1150	0.0754	0.1904		1,721.8063	1,721.8063	0.1554		1,725.6919
Worker	1.4964	1.0979	10.3865	0.0246	2.3166	0.0171	2.3336	0.6145	0.0158	0.6302		2,444.1455	2,444.1455	0.0922		2,446.4503
Total	**1.8622**	**9.4526**	**12.9077**	**0.0407**	**2.7160**	**0.0959**	**2.8119**	**0.7294**	**0.0912**	**0.8206**		**4,165.9518**	**4,165.9518**	**0.2476**		**4,172.1423**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665		2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**		**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665	0.0000	2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**	**0.0000**	**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

3.6 architectural coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	21.2244					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**21.5568**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2972	0.2180	2.0626	4.8800e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		485.3622	485.3622	0.0183		485.8199
Total	**0.2972**	**0.2180**	**2.0626**	**4.8800e-003**	**0.4600**	**3.3900e-003**	**0.4634**	**0.1220**	**3.1300e-003**	**0.1252**		**485.3622**	**485.3622**	**0.0183**		**485.8199**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	21.2244					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**21.5568**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2972	0.2180	2.0626	4.8800e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		485.3622	485.3622	0.0183		485.8199
Total	**0.2972**	**0.2180**	**2.0626**	**4.8800e-003**	**0.4600**	**3.3900e-003**	**0.4634**	**0.1220**	**3.1300e-003**	**0.1252**		**485.3622**	**485.3622**	**0.0183**		**485.8199**

4.0 Operational Detail - Mobile

Oceanside Construction - 5 acre full

S5 - San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	325.00	Dwelling Unit	2.50	325,000.00	930
Strip Mall	150.00	1000sqft	2.50	150,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2024
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - See Assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Construction Off-road Equipment Mitigation -

Architectural Coating - see assumptions

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	10.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	10.00
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	18.00	180.00
tblConstructionPhase	PhaseEndDate	12/30/2016	12/27/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/27/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/8/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	3/6/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/9/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/28/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/9/2017
tblLandUse	LotAcreage	8.55	2.50
tblLandUse	LotAcreage	3.44	2.50
tblProjectCharacteristics	OperationalYear	2018	2024

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	26.6117	56.6308	46.9641	0.0938	6.6756	3.0427	8.4539	3.4002	2.8364	5.0362	0.0000	9,487.9767	9,487.9767	1.6150	0.0000	9,528.3511

Maximum	**26.6117**	**56.6308**	**46.9641**	**0.0938**	**6.6756**	**3.0427**	**8.4539**	**3.4002**	**2.8364**	**5.0362**	**0.0000**	**9,487.9767**	**9,487.9767**	**1.6150**	**0.0000**	**9,528.3511**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	26.6117	56.6308	46.9641	0.0938	3.1760	3.0427	5.8819	1.4723	2.8364	3.5985	0.0000	9,487.9767	9,487.9767	1.6150	0.0000	9,528.3511
Maximum	**26.6117**	**56.6308**	**46.9641**	**0.0938**	**3.1760**	**3.0427**	**5.8819**	**1.4723**	**2.8364**	**3.5985**	**0.0000**	**9,487.9767**	**9,487.9767**	**1.6150**	**0.0000**	**9,528.3511**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**52.42**	**0.00**	**30.42**	**56.70**	**0.00**	**28.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/27/2017	5	20	
2	Grading	Grading	1/28/2017	2/8/2017	5	8	
3	Building Construction	Building Construction	2/9/2017	12/27/2017	5	230	
4	Paving	Paving	2/9/2017	3/6/2017	5	18	
5	architectural coating	Architectural Coating	4/1/2017	12/8/2017	5	180	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 658,125; Residential Outdoor: 219,375; Non-Residential Indoor: 225,000; Non-Residential Outdoor: 75,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
architectural coating	Air Compressors	1	6.00	78	0.48
Demolition	Excavators	3	8.00	158	0.38
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Grading	Excavators	1	8.00	158	0.38
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Paving	Pavers	2	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Paving	Paving Equipment	2	8.00	132	0.36
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
architectural coating	1	56.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	282.00	59.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

Demolition	6	15.00	0.00	455.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					4.9832	0.0000	4.9832	0.7546	0.0000	0.7546			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425		3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**4.9832**	**2.1935**	**7.1766**	**0.7546**	**2.0425**	**2.7971**		**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.2450	7.8821	1.5855	0.0185	0.3975	0.0445	0.4420	0.1090	0.0425	0.1515		2,006.7722	2,006.7722	0.1782		2,011.2278
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.3155**	**7.9341**	**2.1645**	**0.0199**	**0.5208**	**0.0454**	**0.5661**	**0.1416**	**0.0434**	**0.1850**		**2,145.2390**	**2,145.2390**	**0.1834**		**2,149.8231**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.1303	0.0000	2.1303	0.3226	0.0000	0.3226			0.0000			0.0000
Off-Road	4.1031	42.7475	23.0122	0.0388		2.1935	2.1935		2.0425	2.0425	0.0000	3,924.2833	3,924.2833	1.0730		3,951.1070
Total	**4.1031**	**42.7475**	**23.0122**	**0.0388**	**2.1303**	**2.1935**	**4.3238**	**0.3226**	**2.0425**	**2.3651**	**0.0000**	**3,924.2833**	**3,924.2833**	**1.0730**		**3,951.1070**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2450	7.8821	1.5855	0.0185	0.3975	0.0445	0.4420	0.1090	0.0425	0.1515		2,006.7722	2,006.7722	0.1782		2,011.2278
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953

Total	**0.3155**	**7.9341**	**2.1645**	**0.0199**	**0.5208**	**0.0454**	**0.5661**	**0.1416**	**0.0434**	**0.1850**		**2,145.2390**	**2,145.2390**	**0.1834**		**2,149.8231**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352		3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**6.5523**	**1.7774**	**8.3298**	**3.3675**	**1.6352**	**5.0027**		**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.8011	0.0000	2.8011	1.4396	0.0000	1.4396			0.0000			0.0000
Off-Road	3.0705	33.8868	17.1042	0.0297		1.7774	1.7774		1.6352	1.6352	0.0000	3,037.9107	3,037.9107	0.9308		3,061.1809
Total	**3.0705**	**33.8868**	**17.1042**	**0.0297**	**2.8011**	**1.7774**	**4.5786**	**1.4396**	**1.6352**	**3.0748**	**0.0000**	**3,037.9107**	**3,037.9107**	**0.9308**		**3,061.1809**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791		2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**		**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3515	8.3287	2.2855	0.0165	0.3994	0.0776	0.4770	0.1150	0.0743	0.1892		1,764.7073	1,764.7073	0.1460		1,768.3577
Worker	1.3253	0.9777	10.8852	0.0262	2.3166	0.0171	2.3336	0.6145	0.0158	0.6302		2,603.1767	2,603.1767	0.0966		2,605.5916
Total	**1.6769**	**9.3064**	**13.1706**	**0.0427**	**2.7160**	**0.0947**	**2.8107**	**0.7294**	**0.0900**	**0.8195**		**4,367.8840**	**4,367.8840**	**0.2426**		**4,373.9492**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.1149	26.5546	18.1825	0.0269		1.7879	1.7879		1.6791	1.6791	0.0000	2,650.9797	2,650.9797	0.6531		2,667.3078
Total	**3.1149**	**26.5546**	**18.1825**	**0.0269**		**1.7879**	**1.7879**		**1.6791**	**1.6791**	**0.0000**	**2,650.9797**	**2,650.9797**	**0.6531**		**2,667.3078**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.3515	8.3287	2.2855	0.0165	0.3994	0.0776	0.4770	0.1150	0.0743	0.1892		1,764.7073	1,764.7073	0.1460		1,768.3577
Worker	1.3253	0.9777	10.8852	0.0262	2.3166	0.0171	2.3336	0.6145	0.0158	0.6302		2,603.1767	2,603.1767	0.0966		2,605.5916
Total	**1.6769**	**9.3064**	**13.1706**	**0.0427**	**2.7160**	**0.0947**	**2.8107**	**0.7294**	**0.0900**	**0.8195**		**4,367.8840**	**4,367.8840**	**0.2426**		**4,373.9492**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665		2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**		**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.9449	20.7178	15.0320	0.0228		1.1592	1.1592		1.0665	1.0665	0.0000	2,330.6461	2,330.6461	0.7141		2,348.4988
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.9449**	**20.7178**	**15.0320**	**0.0228**		**1.1592**	**1.1592**		**1.0665**	**1.0665**	**0.0000**	**2,330.6461**	**2,330.6461**	**0.7141**		**2,348.4988**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

3.6 architectural coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	21.2244					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**21.5568**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2632	0.1941	2.1616	5.2000e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		516.9429	516.9429	0.0192		517.4224
Total	**0.2632**	**0.1941**	**2.1616**	**5.2000e-003**	**0.4600**	**3.3900e-003**	**0.4634**	**0.1220**	**3.1300e-003**	**0.1252**		**516.9429**	**516.9429**	**0.0192**		**517.4224**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	21.2244					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**21.5568**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2632	0.1941	2.1616	5.2000e-003	0.4600	3.3900e-003	0.4634	0.1220	3.1300e-003	0.1252		516.9429	516.9429	0.0192		517.4224
Total	**0.2632**	**0.1941**	**2.1616**	**5.2000e-003**	**0.4600**	**3.3900e-003**	**0.4634**	**0.1220**	**3.1300e-003**	**0.1252**		**516.9429**	**516.9429**	**0.0192**		**517.4224**

4.0 Operational Detail - Mobile

Oceanside Construction - 5 acre full

S5 - San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	325.00	Dwelling Unit	2.50	325,000.00	930
Strip Mall	150.00	1000sqft	2.50	150,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2024
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See Assumptions

Construction Phase - See Assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Architectural Coating - see assumptions

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	10.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	10.00
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	18.00	180.00
tblLandUse	LotAcreage	8.55	2.50
tblLandUse	LotAcreage	3.44	2.50
tblProjectCharacteristics	OperationalYear	2018	2024

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	2.5913	5.1967	4.3752	9.4700e-003	0.4282	0.2724	0.7006	0.1157	0.2564	0.3721	0.0000	865.8008	865.8008	0.1181	0.0000	868.7531
Maximum	**2.5913**	**5.1967**	**4.3752**	**9.4700e-003**	**0.4282**	**0.2724**	**0.7006**	**0.1157**	**0.2564**	**0.3721**	**0.0000**	**865.8008**	**865.8008**	**0.1181**	**0.0000**	**868.7531**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	2.5913	5.1967	4.3752	9.4700e-003	0.3847	0.2724	0.6571	0.1036	0.2564	0.3600	0.0000	865.8003	865.8003	0.1181	0.0000	868.7526
Maximum	**2.5913**	**5.1967**	**4.3752**	**9.4700e-003**	**0.3847**	**0.2724**	**0.6571**	**0.1036**	**0.2564**	**0.3600**	**0.0000**	**865.8003**	**865.8003**	**0.1181**	**0.0000**	**868.7526**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**10.17**	**0.00**	**6.21**	**10.40**	**0.00**	**3.23**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**1-1-2017**	**3-31-2017**	1.6496	1.6496
2	**4-1-2017**	**6-30-2017**	2.1077	2.1077
3	**7-1-2017**	**9-30-2017**	2.1308	2.1308
		Highest	2.1308	2.1308

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2017	1/27/2017	5	20	
2	Grading	Grading	1/28/2017	2/8/2017	5	8	
3	Building Construction	Building Construction	2/9/2017	12/27/2017	5	230	
4	Paving	Paving	2/9/2017	3/6/2017	5	18	
5	architectural coating	Architectural Coating	4/1/2017	12/8/2017	5	180	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 658,125; Residential Outdoor: 219,375; Non-Residential Indoor: 225,000; Non-Residential Outdoor: 75,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
architectural coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	455.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	282.00	59.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
architectural coating	1	56.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0498	0.0000	0.0498	7.5500e-003	0.0000	7.5500e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0410	0.4275	0.2301	3.9000e-004		0.0219	0.0219		0.0204	0.0204	0.0000	35.6005	35.6005	9.7300e-003	0.0000	35.8438
Total	**0.0410**	**0.4275**	**0.2301**	**3.9000e-004**	**0.0498**	**0.0219**	**0.0718**	**7.5500e-003**	**0.0204**	**0.0280**	**0.0000**	**35.6005**	**35.6005**	**9.7300e-003**	**0.0000**	**35.8438**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.4800e-003	0.0805	0.0164	1.8000e-004	3.8900e-003	4.5000e-004	4.3400e-003	1.0700e-003	4.3000e-004	1.5000e-003	0.0000	18.0831	18.0831	1.6400e-003	0.0000	18.1242
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.1000e-004	5.7000e-004	5.5100e-003	1.0000e-005	1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.1912	1.1912	4.0000e-005	0.0000	1.1923

Total	**3.1900e-003**	**0.0811**	**0.0219**	**1.9000e-004**	**5.0900e-003**	**4.6000e-004**	**5.5500e-003**	**1.3900e-003**	**4.4000e-004**	**1.8300e-003**	**0.0000**	**19.2743**	**19.2743**	**1.6800e-003**	**0.0000**	**19.3165**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0213	0.0000	0.0213	3.2300e-003	0.0000	3.2300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0410	0.4275	0.2301	3.9000e-004		0.0219	0.0219		0.0204	0.0204	0.0000	35.6005	35.6005	9.7300e-003	0.0000	35.8438
Total	**0.0410**	**0.4275**	**0.2301**	**3.9000e-004**	**0.0213**	**0.0219**	**0.0432**	**3.2300e-003**	**0.0204**	**0.0237**	**0.0000**	**35.6005**	**35.6005**	**9.7300e-003**	**0.0000**	**35.8438**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.4800e-003	0.0805	0.0164	1.8000e-004	3.8900e-003	4.5000e-004	4.3400e-003	1.0700e-003	4.3000e-004	1.5000e-003	0.0000	18.0831	18.0831	1.6400e-003	0.0000	18.1242
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.1000e-004	5.7000e-004	5.5100e-003	1.0000e-005	1.2000e-003	1.0000e-005	1.2100e-003	3.2000e-004	1.0000e-005	3.3000e-004	0.0000	1.1912	1.1912	4.0000e-005	0.0000	1.1923
Total	**3.1900e-003**	**0.0811**	**0.0219**	**1.9000e-004**	**5.0900e-003**	**4.6000e-004**	**5.5500e-003**	**1.3900e-003**	**4.4000e-004**	**1.8300e-003**	**0.0000**	**19.2743**	**19.2743**	**1.6800e-003**	**0.0000**	**19.3165**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0262	0.0000	0.0262	0.0135	0.0000	0.0135	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0123	0.1356	0.0684	1.2000e-004		7.1100e-003	7.1100e-003		6.5400e-003	6.5400e-003	0.0000	11.0238	11.0238	3.3800e-003	0.0000	11.1082
Total	**0.0123**	**0.1356**	**0.0684**	**1.2000e-004**	**0.0262**	**7.1100e-003**	**0.0333**	**0.0135**	**6.5400e-003**	**0.0200**	**0.0000**	**11.0238**	**11.0238**	**3.3800e-003**	**0.0000**	**11.1082**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.8000e-004	2.3000e-004	2.2100e-003	1.0000e-005	4.8000e-004	0.0000	4.8000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4765	0.4765	2.0000e-005	0.0000	0.4769
Total	**2.8000e-004**	**2.3000e-004**	**2.2100e-003**	**1.0000e-005**	**4.8000e-004**	**0.0000**	**4.8000e-004**	**1.3000e-004**	**0.0000**	**1.3000e-004**	**0.0000**	**0.4765**	**0.4765**	**2.0000e-005**	**0.0000**	**0.4769**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Fugitive Dust					0.0112	0.0000	0.0112	5.7600e-003	0.0000	5.7600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0123	0.1356	0.0684	1.2000e-004		7.1100e-003	7.1100e-003		6.5400e-003	6.5400e-003	0.0000	11.0238	11.0238	3.3800e-003	0.0000	11.1082
Total	**0.0123**	**0.1356**	**0.0684**	**1.2000e-004**	**0.0112**	**7.1100e-003**	**0.0183**	**5.7600e-003**	**6.5400e-003**	**0.0123**	**0.0000**	**11.0238**	**11.0238**	**3.3800e-003**	**0.0000**	**11.1082**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.8000e-004	2.3000e-004	2.2100e-003	1.0000e-005	4.8000e-004	0.0000	4.8000e-004	1.3000e-004	0.0000	1.3000e-004	0.0000	0.4765	0.4765	2.0000e-005	0.0000	0.4769
Total	**2.8000e-004**	**2.3000e-004**	**2.2100e-003**	**1.0000e-005**	**4.8000e-004**	**0.0000**	**4.8000e-004**	**1.3000e-004**	**0.0000**	**1.3000e-004**	**0.0000**	**0.4765**	**0.4765**	**2.0000e-005**	**0.0000**	**0.4769**

3.4 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3582	3.0538	2.0910	3.1000e-003		0.2056	0.2056		0.1931	0.1931	0.0000	276.5668	276.5668	0.0681	0.0000	278.2702
Total	**0.3582**	**3.0538**	**2.0910**	**3.1000e-003**		**0.2056**	**0.2056**		**0.1931**	**0.1931**	**0.0000**	**276.5668**	**276.5668**	**0.0681**	**0.0000**	**278.2702**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0411	0.9715	0.2762	1.8800e-003	0.0450	8.9900e-003	0.0540	0.0130	8.6000e-003	0.0216	0.0000	182.2255	182.2255	0.0157	0.0000	182.6174
Worker	0.1532	0.1241	1.1918	2.8500e-003	0.2601	1.9600e-003	0.2620	0.0691	1.8100e-003	0.0709	0.0000	257.5300	257.5300	9.6600e-003	0.0000	257.7716
Total	**0.1943**	**1.0957**	**1.4680**	**4.7300e-003**	**0.3051**	**0.0110**	**0.3160**	**0.0821**	**0.0104**	**0.0925**	**0.0000**	**439.7555**	**439.7555**	**0.0253**	**0.0000**	**440.3890**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3582	3.0538	2.0910	3.1000e-003		0.2056	0.2056		0.1931	0.1931	0.0000	276.5664	276.5664	0.0681	0.0000	278.2699
Total	**0.3582**	**3.0538**	**2.0910**	**3.1000e-003**		**0.2056**	**0.2056**		**0.1931**	**0.1931**	**0.0000**	**276.5664**	**276.5664**	**0.0681**	**0.0000**	**278.2699**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0411	0.9715	0.2762	1.8800e-003	0.0450	8.9900e-003	0.0540	0.0130	8.6000e-003	0.0216	0.0000	182.2255	182.2255	0.0157	0.0000	182.6174
Worker	0.1532	0.1241	1.1918	2.8500e-003	0.2601	1.9600e-003	0.2620	0.0691	1.8100e-003	0.0709	0.0000	257.5300	257.5300	9.6600e-003	0.0000	257.7716
Total	**0.1943**	**1.0957**	**1.4680**	**4.7300e-003**	**0.3051**	**0.0110**	**0.3160**	**0.0821**	**0.0104**	**0.0925**	**0.0000**	**439.7555**	**439.7555**	**0.0253**	**0.0000**	**440.3890**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0175	0.1865	0.1353	2.1000e-004		0.0104	0.0104		9.6000e-003	9.6000e-003	0.0000	19.0289	19.0289	5.8300e-003	0.0000	19.1747
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0175**	**0.1865**	**0.1353**	**2.1000e-004**		**0.0104**	**0.0104**		**9.6000e-003**	**9.6000e-003**	**0.0000**	**19.0289**	**19.0289**	**5.8300e-003**	**0.0000**	**19.1747**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4000e-004	5.2000e-004	4.9600e-003	1.0000e-005	1.0800e-003	1.0000e-005	1.0900e-003	2.9000e-004	1.0000e-005	3.0000e-004	0.0000	1.0721	1.0721	4.0000e-005	0.0000	1.0731
Total	**6.4000e-004**	**5.2000e-004**	**4.9600e-003**	**1.0000e-005**	**1.0800e-003**	**1.0000e-005**	**1.0900e-003**	**2.9000e-004**	**1.0000e-005**	**3.0000e-004**	**0.0000**	**1.0721**	**1.0721**	**4.0000e-005**	**0.0000**	**1.0731**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0175	0.1865	0.1353	2.1000e-004		0.0104	0.0104		9.6000e-003	9.6000e-003	0.0000	19.0289	19.0289	5.8300e-003	0.0000	19.1747
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0175**	**0.1865**	**0.1353**	**2.1000e-004**		**0.0104**	**0.0104**		**9.6000e-003**	**9.6000e-003**	**0.0000**	**19.0289**	**19.0289**	**5.8300e-003**	**0.0000**	**19.1747**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4000e-004	5.2000e-004	4.9600e-003	1.0000e-005	1.0800e-003	1.0000e-005	1.0900e-003	2.9000e-004	1.0000e-005	3.0000e-004	0.0000	1.0721	1.0721	4.0000e-005	0.0000	1.0731
Total	**6.4000e-004**	**5.2000e-004**	**4.9600e-003**	**1.0000e-005**	**1.0800e-003**	**1.0000e-005**	**1.0900e-003**	**2.9000e-004**	**1.0000e-005**	**3.0000e-004**	**0.0000**	**1.0721**	**1.0721**	**4.0000e-005**	**0.0000**	**1.0731**

3.6 architectural coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.9102					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0299	0.1967	0.1681	2.7000e-004		0.0156	0.0156		0.0156	0.0156	0.0000	22.9793	22.9793	2.4300e-003	0.0000	23.0399
Total	**1.9401**	**0.1967**	**0.1681**	**2.7000e-004**		**0.0156**	**0.0156**		**0.0156**	**0.0156**	**0.0000**	**22.9793**	**22.9793**	**2.4300e-003**	**0.0000**	**23.0399**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0238	0.0193	0.1852	4.4000e-004	0.0404	3.0000e-004	0.0407	0.0107	2.8000e-004	0.0110	0.0000	40.0232	40.0232	1.5000e-003	0.0000	40.0607
Total	**0.0238**	**0.0193**	**0.1852**	**4.4000e-004**	**0.0404**	**3.0000e-004**	**0.0407**	**0.0107**	**2.8000e-004**	**0.0110**	**0.0000**	**40.0232**	**40.0232**	**1.5000e-003**	**0.0000**	**40.0607**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1.9102					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0299	0.1967	0.1681	2.7000e-004		0.0156	0.0156		0.0156	0.0156	0.0000	22.9793	22.9793	2.4300e-003	0.0000	23.0399
Total	**1.9401**	**0.1967**	**0.1681**	**2.7000e-004**		**0.0156**	**0.0156**		**0.0156**	**0.0156**	**0.0000**	**22.9793**	**22.9793**	**2.4300e-003**	**0.0000**	**23.0399**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0238	0.0193	0.1852	4.4000e-004	0.0404	3.0000e-004	0.0407	0.0107	2.8000e-004	0.0110	0.0000	40.0232	40.0232	1.5000e-003	0.0000	40.0607
Total	**0.0238**	**0.0193**	**0.1852**	**4.4000e-004**	**0.0404**	**3.0000e-004**	**0.0407**	**0.0107**	**2.8000e-004**	**0.0110**	**0.0000**	**40.0232**	**40.0232**	**1.5000e-003**	**0.0000**	**40.0607**

4.0 Operational Detail - Mobile

Construction
Scenario 6
CalEEMod

Oceanside - 2 acre - San Diego County, Winter

Oceanside - 2 acre

S6 - San Diego County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	130.00	Dwelling Unit	1.00	130,000.00	372
Strip Mall	60.00	1000sqft	1.00	60,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See assumptions

Construction Phase - See Assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Architectural Coating - see assumptions

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	10.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	10.00
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	10.00	90.00
tblConstructionPhase	PhaseEndDate	12/30/2016	12/22/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	11/9/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/27/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/2/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/16/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	8/20/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/3/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/28/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/3/2017
tblLandUse	LotAcreage	3.42	1.00
tblLandUse	LotAcreage	1.38	1.00
tblProjectCharacteristics	OperationalYear	2018	2019

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					

2017	21.5242	43.5982	34.2592	0.0606	6.6345	2.5429	7.9336	3.3893	2.3965	4.5845	0.0000	5,959.6844	5,959.6844	1.1699	0.0000	5,988.9318
Maximum	**21.5242**	**43.5982**	**34.2592**	**0.0606**	**6.6345**	**2.5429**	**7.9336**	**3.3893**	**2.3965**	**4.5845**	**0.0000**	**5,959.6844**	**5,959.6844**	**1.1699**	**0.0000**	**5,988.9318**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	21.5242	43.5982	34.2592	0.0606	2.8833	2.5429	4.1824	1.4614	2.3965	2.7222	0.0000	5,959.6844	5,959.6844	1.1699	0.0000	5,988.9318
Maximum	**21.5242**	**43.5982**	**34.2592**	**0.0606**	**2.8833**	**2.5429**	**4.1824**	**1.4614**	**2.3965**	**2.7222**	**0.0000**	**5,959.6844**	**5,959.6844**	**1.1699**	**0.0000**	**5,988.9318**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**56.54**	**0.00**	**47.28**	**56.88**	**0.00**	**40.62**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	8/20/2017	12/22/2017	5	90	
2	Building Construction	Building Construction	2/3/2017	11/9/2017	5	200	
3	Grading	Grading	1/28/2017	2/2/2017	5	4	

4	Paving	Paving	2/3/2017	2/16/2017	5	10	
5	Demolition	Demolition	1/1/2017	1/27/2017	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 2

Acres of Paving: 0

Residential Indoor: 263,250; Residential Outdoor: 87,750; Non-Residential Indoor: 90,000; Non-Residential Outdoor: 30,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Paving	Pavers	1	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	23.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	113.00	24.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	5	13.00	0.00	182.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	16.9796					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**17.3119**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1221	0.0896	0.8471	2.0000e-003	0.1889	1.3900e-003	0.1903	0.0501	1.2800e-003	0.0514		199.3452	199.3452	7.5200e-003		199.5332
Total	**0.1221**	**0.0896**	**0.8471**	**2.0000e-003**	**0.1889**	**1.3900e-003**	**0.1903**	**0.0501**	**1.2800e-003**	**0.0514**		**199.3452**	**199.3452**	**7.5200e-003**		**199.5332**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	16.9796					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**17.3119**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1221	0.0896	0.8471	2.0000e-003	0.1889	1.3900e-003	0.1903	0.0501	1.2800e-003	0.0514		199.3452	199.3452	7.5200e-003		199.5332
Total	**0.1221**	**0.0896**	**0.8471**	**2.0000e-003**	**0.1889**	**1.3900e-003**	**0.1903**	**0.0501**	**1.2800e-003**	**0.0514**		**199.3452**	**199.3452**	**7.5200e-003**		**199.5332**

3.3 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3418	23.0287	16.3102	0.0250		1.4697	1.4697		1.4068	1.4068		2,347.6211	2,347.6211	0.5228		2,360.6922
Total	**3.3418**	**23.0287**	**16.3102**	**0.0250**		**1.4697**	**1.4697**		**1.4068**	**1.4068**		**2,347.6211**	**2,347.6211**	**0.5228**		**2,360.6922**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1488	3.3985	1.0256	6.5600e-003	0.1625	0.0321	0.1945	0.0468	0.0307	0.0775		700.3958	700.3958	0.0632		701.9764
Worker	0.5996	0.4400	4.1620	9.8400e-003	0.9283	6.8400e-003	0.9351	0.2462	6.3100e-003	0.2525		979.3916	979.3916	0.0369		980.3152

Total	**0.7484**	**3.8385**	**5.1875**	**0.0164**	**1.0907**	**0.0389**	**1.1296**	**0.2930**	**0.0370**	**0.3300**		**1,679.7874**	**1,679.7874**	**0.1002**		**1,682.2916**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3418	23.0287	16.3102	0.0250		1.4697	1.4697		1.4068	1.4068	0.0000	2,347.6211	2,347.6211	0.5228		2,360.6922
Total	**3.3418**	**23.0287**	**16.3102**	**0.0250**		**1.4697**	**1.4697**		**1.4068**	**1.4068**	**0.0000**	**2,347.6211**	**2,347.6211**	**0.5228**		**2,360.6922**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1488	3.3985	1.0256	6.5600e-003	0.1625	0.0321	0.1945	0.0468	0.0307	0.0775		700.3958	700.3958	0.0632		701.9764
Worker	0.5996	0.4400	4.1620	9.8400e-003	0.9283	6.8400e-003	0.9351	0.2462	6.3100e-003	0.2525		979.3916	979.3916	0.0369		980.3152
Total	**0.7484**	**3.8385**	**5.1875**	**0.0164**	**1.0907**	**0.0389**	**1.1296**	**0.2930**	**0.0370**	**0.3300**		**1,679.7874**	**1,679.7874**	**0.1002**		**1,682.2916**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	2.3212	26.1643	10.7753	0.0206		1.2985	1.2985		1.1947	1.1947		2,112.1822	2,112.1822	0.6472		2,128.3614
Total	**2.3212**	**26.1643**	**10.7753**	**0.0206**	**6.5523**	**1.2985**	**7.8509**	**3.3675**	**1.1947**	**4.5621**		**2,112.1822**	**2,112.1822**	**0.6472**		**2,128.3614**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0531	0.0389	0.3683	8.7000e-004	0.0822	6.0000e-004	0.0828	0.0218	5.6000e-004	0.0224		86.6718	86.6718	3.2700e-003		86.7536
Total	**0.0531**	**0.0389**	**0.3683**	**8.7000e-004**	**0.0822**	**6.0000e-004**	**0.0828**	**0.0218**	**5.6000e-004**	**0.0224**		**86.6718**	**86.6718**	**3.2700e-003**		**86.7536**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Fugitive Dust					2.8011	0.0000	2.8011	1.4396	0.0000	1.4396			0.0000			0.0000
Off-Road	2.3212	26.1643	10.7753	0.0206		1.2985	1.2985		1.1947	1.1947	0.0000	2,112.1822	2,112.1822	0.6472		2,128.3614
Total	**2.3212**	**26.1643**	**10.7753**	**0.0206**	**2.8011**	**1.2985**	**4.0997**	**1.4396**	**1.1947**	**2.6343**	**0.0000**	**2,112.1822**	**2,112.1822**	**0.6472**		**2,128.3614**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0531	0.0389	0.3683	8.7000e-004	0.0822	6.0000e-004	0.0828	0.0218	5.6000e-004	0.0224		86.6718	86.6718	3.2700e-003		86.7536
Total	**0.0531**	**0.0389**	**0.3683**	**8.7000e-004**	**0.0822**	**6.0000e-004**	**0.0828**	**0.0218**	**5.6000e-004**	**0.0224**		**86.6718**	**86.6718**	**3.2700e-003**		**86.7536**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6589	16.6726	12.2090	0.0178		1.0334	1.0334		0.9519	0.9519		1,802.2682	1,802.2682	0.5420		1,815.8177
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6589**	**16.6726**	**12.2090**	**0.0178**		**1.0334**	**1.0334**		**0.9519**	**0.9519**		**1,802.2682**	**1,802.2682**	**0.5420**		**1,815.8177**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6589	16.6726	12.2090	0.0178		1.0334	1.0334		0.9519	0.9519	0.0000	1,802.2682	1,802.2682	0.5420		1,815.8177
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6589**	**16.6726**	**12.2090**	**0.0178**		**1.0334**	**1.0334**		**0.9519**	**0.9519**	**0.0000**	**1,802.2682**	**1,802.2682**	**0.5420**		**1,815.8177**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0796	0.0584	0.5525	1.3100e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		130.0077	130.0077	4.9000e-003		130.1303
Total	**0.0796**	**0.0584**	**0.5525**	**1.3100e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**130.0077**	**130.0077**	**4.9000e-003**		**130.1303**

3.6 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.9933	0.0000	1.9933	0.3019	0.0000	0.3019			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404		2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**1.9933**	**1.6477**	**3.6409**	**0.3019**	**1.5404**	**1.8422**		**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1006	3.1906	0.6823	7.2900e-003	0.1590	0.0181	0.1771	0.0436	0.0173	0.0609		789.8992	789.8992	0.0740		791.7502

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0690	0.0506	0.4788	1.1300e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		112.6734	112.6734	4.2500e-003		112.7796
Total	**0.1696**	**3.2413**	**1.1611**	**8.4200e-003**	**0.2658**	**0.0189**	**0.2847**	**0.0719**	**0.0181**	**0.0900**		**902.5725**	**902.5725**	**0.0783**		**904.5299**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.8521	0.0000	0.8521	0.1290	0.0000	0.1290			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404	0.0000	2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**0.8521**	**1.6477**	**2.4998**	**0.1290**	**1.5404**	**1.6694**	**0.0000**	**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1006	3.1906	0.6823	7.2900e-003	0.1590	0.0181	0.1771	0.0436	0.0173	0.0609		789.8992	789.8992	0.0740		791.7502
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0690	0.0506	0.4788	1.1300e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		112.6734	112.6734	4.2500e-003		112.7796
Total	**0.1696**	**3.2413**	**1.1611**	**8.4200e-003**	**0.2658**	**0.0189**	**0.2847**	**0.0719**	**0.0181**	**0.0900**		**902.5725**	**902.5725**	**0.0783**		**904.5299**

4.0 Operational Detail - Mobile

Oceanside - 2 acre - San Diego County, Summer

Oceanside - 2 acre

S6 - San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	130.00	Dwelling Unit	1.00	130,000.00	372
Strip Mall	60.00	1000sqft	1.00	60,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See assumptions

Construction Phase - See Assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Architectural Coating - see assumptions

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	10.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	10.00
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	10.00	90.00
tblConstructionPhase	PhaseEndDate	12/30/2016	12/22/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	11/9/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/27/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/2/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/16/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	8/20/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/3/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/28/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/3/2017
tblLandUse	LotAcreage	3.42	1.00
tblLandUse	LotAcreage	1.38	1.00
tblProjectCharacteristics	OperationalYear	2018	2019

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					

2017	21.4359	43.5330	34.3897	0.0614	6.6345	2.5424	7.9336	3.3893	2.3960	4.5845	0.0000	6,049.3201	6,049.3201	1.1681	0.0000	6,078.5216
Maximum	**21.4359**	**43.5330**	**34.3897**	**0.0614**	**6.6345**	**2.5424**	**7.9336**	**3.3893**	**2.3960**	**4.5845**	**0.0000**	**6,049.3201**	**6,049.3201**	**1.1681**	**0.0000**	**6,078.5216**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	21.4359	43.5330	34.3897	0.0614	2.8833	2.5424	4.1824	1.4614	2.3960	2.7217	0.0000	6,049.3200	6,049.3200	1.1681	0.0000	6,078.5216
Maximum	**21.4359**	**43.5330**	**34.3897**	**0.0614**	**2.8833**	**2.5424**	**4.1824**	**1.4614**	**2.3960**	**2.7217**	**0.0000**	**6,049.3200**	**6,049.3200**	**1.1681**	**0.0000**	**6,078.5216**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**56.54**	**0.00**	**47.28**	**56.88**	**0.00**	**40.63**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	8/20/2017	12/22/2017	5	90	
2	Building Construction	Building Construction	2/3/2017	11/9/2017	5	200	
3	Grading	Grading	1/28/2017	2/2/2017	5	4	

4	Paving	Paving	2/3/2017	2/16/2017	5	10	
5	Demolition	Demolition	1/1/2017	1/27/2017	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 2

Acres of Paving: 0

Residential Indoor: 263,250; Residential Outdoor: 87,750; Non-Residential Indoor: 90,000; Non-Residential Outdoor: 30,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Paving	Pavers	1	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Paving	Paving Equipment	1	8.00	132	0.36
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	23.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	113.00	24.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	5	13.00	0.00	182.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	16.9796					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733		281.4481	281.4481	0.0297		282.1909
Total	**17.3119**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**		**281.4481**	**281.4481**	**0.0297**		**282.1909**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1081	0.0797	0.8878	2.1300e-003	0.1889	1.3900e-003	0.1903	0.0501	1.2800e-003	0.0514		212.3158	212.3158	7.8800e-003		212.5128
Total	**0.1081**	**0.0797**	**0.8878**	**2.1300e-003**	**0.1889**	**1.3900e-003**	**0.1903**	**0.0501**	**1.2800e-003**	**0.0514**		**212.3158**	**212.3158**	**7.8800e-003**		**212.5128**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	16.9796					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3323	2.1850	1.8681	2.9700e-003		0.1733	0.1733		0.1733	0.1733	0.0000	281.4481	281.4481	0.0297		282.1909
Total	**17.3119**	**2.1850**	**1.8681**	**2.9700e-003**		**0.1733**	**0.1733**		**0.1733**	**0.1733**	**0.0000**	**281.4481**	**281.4481**	**0.0297**		**282.1909**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1081	0.0797	0.8878	2.1300e-003	0.1889	1.3900e-003	0.1903	0.0501	1.2800e-003	0.0514		212.3158	212.3158	7.8800e-003		212.5128
Total	**0.1081**	**0.0797**	**0.8878**	**2.1300e-003**	**0.1889**	**1.3900e-003**	**0.1903**	**0.0501**	**1.2800e-003**	**0.0514**		**212.3158**	**212.3158**	**7.8800e-003**		**212.5128**

3.3 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3418	23.0287	16.3102	0.0250		1.4697	1.4697		1.4068	1.4068		2,347.6211	2,347.6211	0.5228		2,360.6922
Total	**3.3418**	**23.0287**	**16.3102**	**0.0250**		**1.4697**	**1.4697**		**1.4068**	**1.4068**		**2,347.6211**	**2,347.6211**	**0.5228**		**2,360.6922**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1430	3.3879	0.9297	6.7200e-003	0.1625	0.0316	0.1941	0.0468	0.0302	0.0770		717.8471	717.8471	0.0594		719.3319
Worker	0.5311	0.3918	4.3618	0.0105	0.9283	6.8400e-003	0.9351	0.2462	6.3100e-003	0.2525		1,043.1169	1,043.1169	0.0387		1,044.0846

Total	**0.6741**	**3.7797**	**5.2915**	**0.0172**	**1.0907**	**0.0384**	**1.1292**	**0.2930**	**0.0365**	**0.3295**		**1,760.9639**	**1,760.9639**	**0.0981**		**1,763.4165**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3418	23.0287	16.3102	0.0250		1.4697	1.4697		1.4068	1.4068	0.0000	2,347.6211	2,347.6211	0.5228		2,360.6922
Total	**3.3418**	**23.0287**	**16.3102**	**0.0250**		**1.4697**	**1.4697**		**1.4068**	**1.4068**	**0.0000**	**2,347.6211**	**2,347.6211**	**0.5228**		**2,360.6922**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.1430	3.3879	0.9297	6.7200e-003	0.1625	0.0316	0.1941	0.0468	0.0302	0.0770		717.8471	717.8471	0.0594		719.3319
Worker	0.5311	0.3918	4.3618	0.0105	0.9283	6.8400e-003	0.9351	0.2462	6.3100e-003	0.2525		1,043.1169	1,043.1169	0.0387		1,044.0846
Total	**0.6741**	**3.7797**	**5.2915**	**0.0172**	**1.0907**	**0.0384**	**1.1292**	**0.2930**	**0.0365**	**0.3295**		**1,760.9639**	**1,760.9639**	**0.0981**		**1,763.4165**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5523	0.0000	6.5523	3.3675	0.0000	3.3675			0.0000			0.0000
Off-Road	2.3212	26.1643	10.7753	0.0206		1.2985	1.2985		1.1947	1.1947		2,112.1822	2,112.1822	0.6472		2,128.3614
Total	**2.3212**	**26.1643**	**10.7753**	**0.0206**	**6.5523**	**1.2985**	**7.8509**	**3.3675**	**1.1947**	**4.5621**		**2,112.1822**	**2,112.1822**	**0.6472**		**2,128.3614**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0470	0.0347	0.3860	9.3000e-004	0.0822	6.0000e-004	0.0828	0.0218	5.6000e-004	0.0224		92.3112	92.3112	3.4300e-003		92.3969
Total	**0.0470**	**0.0347**	**0.3860**	**9.3000e-004**	**0.0822**	**6.0000e-004**	**0.0828**	**0.0218**	**5.6000e-004**	**0.0224**		**92.3112**	**92.3112**	**3.4300e-003**		**92.3969**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					

Fugitive Dust					2.8011	0.0000	2.8011	1.4396	0.0000	1.4396			0.0000			0.0000
Off-Road	2.3212	26.1643	10.7753	0.0206		1.2985	1.2985		1.1947	1.1947	0.0000	2,112.1822	2,112.1822	0.6472		2,128.3614
Total	**2.3212**	**26.1643**	**10.7753**	**0.0206**	**2.8011**	**1.2985**	**4.0997**	**1.4396**	**1.1947**	**2.6343**	**0.0000**	**2,112.1822**	**2,112.1822**	**0.6472**		**2,128.3614**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0470	0.0347	0.3860	9.3000e-004	0.0822	6.0000e-004	0.0828	0.0218	5.6000e-004	0.0224		92.3112	92.3112	3.4300e-003		92.3969
Total	**0.0470**	**0.0347**	**0.3860**	**9.3000e-004**	**0.0822**	**6.0000e-004**	**0.0828**	**0.0218**	**5.6000e-004**	**0.0224**		**92.3112**	**92.3112**	**3.4300e-003**		**92.3969**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6589	16.6726	12.2090	0.0178		1.0334	1.0334		0.9519	0.9519		1,802.2682	1,802.2682	0.5420		1,815.8177
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6589**	**16.6726**	**12.2090**	**0.0178**		**1.0334**	**1.0334**		**0.9519**	**0.9519**		**1,802.2682**	**1,802.2682**	**0.5420**		**1,815.8177**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6589	16.6726	12.2090	0.0178		1.0334	1.0334		0.9519	0.9519	0.0000	1,802.2682	1,802.2682	0.5420		1,815.8177
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.6589**	**16.6726**	**12.2090**	**0.0178**		**1.0334**	**1.0334**		**0.9519**	**0.9519**	**0.0000**	**1,802.2682**	**1,802.2682**	**0.5420**		**1,815.8177**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0705	0.0520	0.5790	1.3900e-003	0.1232	9.1000e-004	0.1241	0.0327	8.4000e-004	0.0335		138.4668	138.4668	5.1400e-003		138.5953
Total	**0.0705**	**0.0520**	**0.5790**	**1.3900e-003**	**0.1232**	**9.1000e-004**	**0.1241**	**0.0327**	**8.4000e-004**	**0.0335**		**138.4668**	**138.4668**	**5.1400e-003**		**138.5953**

3.6 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					1.9933	0.0000	1.9933	0.3019	0.0000	0.3019			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404		2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**1.9933**	**1.6477**	**3.6409**	**0.3019**	**1.5404**	**1.8422**		**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0980	3.1528	0.6342	7.4000e-003	0.1590	0.0178	0.1768	0.0436	0.0170	0.0606		802.7089	802.7089	0.0713		804.4911

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0611	0.0451	0.5018	1.2100e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		120.0046	120.0046	4.4500e-003		120.1159
Total	**0.1591**	**3.1979**	**1.1360**	**8.6100e-003**	**0.2658**	**0.0186**	**0.2844**	**0.0719**	**0.0178**	**0.0897**		**922.7135**	**922.7135**	**0.0757**		**924.6070**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.8521	0.0000	0.8521	0.1290	0.0000	0.1290			0.0000			0.0000
Off-Road	2.7625	26.7594	15.5573	0.0241		1.6477	1.6477		1.5404	1.5404	0.0000	2,421.4229	2,421.4229	0.6125		2,436.7347
Total	**2.7625**	**26.7594**	**15.5573**	**0.0241**	**0.8521**	**1.6477**	**2.4998**	**0.1290**	**1.5404**	**1.6694**	**0.0000**	**2,421.4229**	**2,421.4229**	**0.6125**		**2,436.7347**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0980	3.1528	0.6342	7.4000e-003	0.1590	0.0178	0.1768	0.0436	0.0170	0.0606		802.7089	802.7089	0.0713		804.4911
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0611	0.0451	0.5018	1.2100e-003	0.1068	7.9000e-004	0.1076	0.0283	7.3000e-004	0.0291		120.0046	120.0046	4.4500e-003		120.1159
Total	**0.1591**	**3.1979**	**1.1360**	**8.6100e-003**	**0.2658**	**0.0186**	**0.2844**	**0.0719**	**0.0178**	**0.0897**		**922.7135**	**922.7135**	**0.0757**		**924.6070**

4.0 Operational Detail - Mobile

Oceanside - 2 acre - San Diego County, Annual

Oceanside - 2 acre

S6 - San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	130.00	Dwelling Unit	1.00	130,000.00	372
Strip Mall	60.00	1000sqft	1.00	60,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2019
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See assumptions

Construction Phase - See Assumptions

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Demolition -

Architectural Coating - see assumptions

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	EF_Nonresidential_Interior	250.00	10.00
tblArchitecturalCoating	EF_Residential_Interior	250.00	10.00
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	15
tblConstructionPhase	NumDays	10.00	90.00
tblConstructionPhase	PhaseEndDate	12/30/2016	12/22/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	11/9/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	1/27/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/2/2017
tblConstructionPhase	PhaseEndDate	12/30/2016	2/16/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	8/20/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/3/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	1/28/2017
tblConstructionPhase	PhaseStartDate	12/31/2016	2/3/2017
tblLandUse	LotAcreage	3.42	1.00
tblLandUse	LotAcreage	1.38	1.00
tblProjectCharacteristics	OperationalYear	2018	2019

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					

2017	1.2286	3.2284	2.5191	4.8500e-003	0.1513	0.1831	0.3344	0.0415	0.1749	0.2165	0.0000	429.8668	429.8668	0.0678	0.0000	431.5613
Maximum	**1.2286**	**3.2284**	**2.5191**	**4.8500e-003**	**0.1513**	**0.1831**	**0.3344**	**0.0415**	**0.1749**	**0.2165**	**0.0000**	**429.8668**	**429.8668**	**0.0678**	**0.0000**	**431.5613**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2017	1.2286	3.2284	2.5191	4.8500e-003	0.1323	0.1831	0.3155	0.0360	0.1749	0.2109	0.0000	429.8665	429.8665	0.0678	0.0000	431.5610
Maximum	**1.2286**	**3.2284**	**2.5191**	**4.8500e-003**	**0.1323**	**0.1831**	**0.3155**	**0.0360**	**0.1749**	**0.2109**	**0.0000**	**429.8665**	**429.8665**	**0.0678**	**0.0000**	**431.5610**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**12.51**	**0.00**	**5.66**	**13.43**	**0.00**	**2.58**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**1-1-2017**	**3-31-2017**	1.1014	1.1014
2	**4-1-2017**	**6-30-2017**	1.0018	1.0018
3	**7-1-2017**	**9-30-2017**	1.3081	1.3081
		Highest	1.3081	1.3081

2.2 Overall Operational

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Architectural Coating	Architectural Coating	8/20/2017	12/22/2017	5	90	
2	Building Construction	Building Construction	2/3/2017	11/9/2017	5	200	
3	Grading	Grading	1/28/2017	2/2/2017	5	4	
4	Paving	Paving	2/3/2017	2/16/2017	5	10	
5	Demolition	Demolition	1/1/2017	1/27/2017	5	20	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 2

Acres of Paving: 0

Residential Indoor: 263,250; Residential Outdoor: 87,750; Non-Residential Indoor: 90,000; Non-Residential Outdoor: 30,000; Striped

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Paving	Pavers	1	8.00	130	0.42
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	8.00	187	0.41

Paving	Paving Equipment	1	8.00	132	0.36
Building Construction	Welders	3	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Architectural Coating	1	23.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	113.00	24.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Demolition	5	13.00	0.00	182.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Soil Stabilizer

Replace Ground Cover

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

Clean Paved Roads

3.2 Architectural Coating - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.7641					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0150	0.0983	0.0841	1.3000e-004		7.8000e-003	7.8000e-003		7.8000e-003	7.8000e-003	0.0000	11.4896	11.4896	1.2100e-003	0.0000	11.5200

Total	**0.7790**	**0.0983**	**0.0841**	**1.3000e-004**		**7.8000e-003**	**7.8000e-003**		**7.8000e-003**	**7.8000e-003**	**0.0000**	**11.4896**	**11.4896**	**1.2100e-003**	**0.0000**	**11.5200**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.8900e-003	3.9600e-003	0.0380	9.0000e-005	8.3000e-003	6.0000e-005	8.3600e-003	2.2100e-003	6.0000e-005	2.2600e-003	0.0000	8.2190	8.2190	3.1000e-004	0.0000	8.2268
Total	**4.8900e-003**	**3.9600e-003**	**0.0380**	**9.0000e-005**	**8.3000e-003**	**6.0000e-005**	**8.3600e-003**	**2.2100e-003**	**6.0000e-005**	**2.2600e-003**	**0.0000**	**8.2190**	**8.2190**	**3.1000e-004**	**0.0000**	**8.2268**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.7641					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0150	0.0983	0.0841	1.3000e-004		7.8000e-003	7.8000e-003		7.8000e-003	7.8000e-003	0.0000	11.4896	11.4896	1.2100e-003	0.0000	11.5200
Total	**0.7790**	**0.0983**	**0.0841**	**1.3000e-004**		**7.8000e-003**	**7.8000e-003**		**7.8000e-003**	**7.8000e-003**	**0.0000**	**11.4896**	**11.4896**	**1.2100e-003**	**0.0000**	**11.5200**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.8900e-003	3.9600e-003	0.0380	9.0000e-005	8.3000e-003	6.0000e-005	8.3600e-003	2.2100e-003	6.0000e-005	2.2600e-003	0.0000	8.2190	8.2190	3.1000e-004	0.0000	8.2268
Total	**4.8900e-003**	**3.9600e-003**	**0.0380**	**9.0000e-005**	**8.3000e-003**	**6.0000e-005**	**8.3600e-003**	**2.2100e-003**	**6.0000e-005**	**2.2600e-003**	**0.0000**	**8.2190**	**8.2190**	**3.1000e-004**	**0.0000**	**8.2268**

3.3 Building Construction - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3342	2.3029	1.6310	2.5000e-003		0.1470	0.1470		0.1407	0.1407	0.0000	212.9726	212.9726	0.0474	0.0000	214.1584
Total	**0.3342**	**2.3029**	**1.6310**	**2.5000e-003**		**0.1470**	**0.1470**		**0.1407**	**0.1407**	**0.0000**	**212.9726**	**212.9726**	**0.0474**	**0.0000**	**214.1584**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0145	0.3437	0.0977	6.7000e-004	0.0159	3.1800e-003	0.0191	4.6000e-003	3.0400e-003	7.6400e-003	0.0000	64.4571	64.4571	5.5400e-003	0.0000	64.5957
Worker	0.0534	0.0433	0.4153	9.9000e-004	0.0906	6.8000e-004	0.0913	0.0241	6.3000e-004	0.0247	0.0000	89.7345	89.7345	3.3700e-003	0.0000	89.8187
Total	**0.0679**	**0.3869**	**0.5130**	**1.6600e-003**	**0.1066**	**3.8600e-003**	**0.1104**	**0.0287**	**3.6700e-003**	**0.0324**	**0.0000**	**154.1916**	**154.1916**	**8.9100e-003**	**0.0000**	**154.4143**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.3342	2.3029	1.6310	2.5000e-003		0.1470	0.1470		0.1407	0.1407	0.0000	212.9724	212.9724	0.0474	0.0000	214.1581
Total	**0.3342**	**2.3029**	**1.6310**	**2.5000e-003**		**0.1470**	**0.1470**		**0.1407**	**0.1407**	**0.0000**	**212.9724**	**212.9724**	**0.0474**	**0.0000**	**214.1581**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0145	0.3437	0.0977	6.7000e-004	0.0159	3.1800e-003	0.0191	4.6000e-003	3.0400e-003	7.6400e-003	0.0000	64.4571	64.4571	5.5400e-003	0.0000	64.5957
Worker	0.0534	0.0433	0.4153	9.9000e-004	0.0906	6.8000e-004	0.0913	0.0241	6.3000e-004	0.0247	0.0000	89.7345	89.7345	3.3700e-003	0.0000	89.8187

Total	**0.0679**	**0.3869**	**0.5130**	**1.6600e-003**	**0.1066**	**3.8600e-003**	**0.1104**	**0.0287**	**3.6700e-003**	**0.0324**	**0.0000**	**154.1916**	**154.1916**	**8.9100e-003**	**0.0000**	**154.4143**

3.4 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0131	0.0000	0.0131	6.7300e-003	0.0000	6.7300e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.6400e-003	0.0523	0.0216	4.0000e-005		2.6000e-003	2.6000e-003		2.3900e-003	2.3900e-003	0.0000	3.8323	3.8323	1.1700e-003	0.0000	3.8616
Total	**4.6400e-003**	**0.0523**	**0.0216**	**4.0000e-005**	**0.0131**	**2.6000e-003**	**0.0157**	**6.7300e-003**	**2.3900e-003**	**9.1200e-003**	**0.0000**	**3.8323**	**3.8323**	**1.1700e-003**	**0.0000**	**3.8616**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0000e-005	8.0000e-005	7.4000e-004	0.0000	1.6000e-004	0.0000	1.6000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1588	0.1588	1.0000e-005	0.0000	0.1590
Total	**9.0000e-005**	**8.0000e-005**	**7.4000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**0.0000**	**0.1588**	**0.1588**	**1.0000e-005**	**0.0000**	**0.1590**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.6000e-003	0.0000	5.6000e-003	2.8800e-003	0.0000	2.8800e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.6400e-003	0.0523	0.0216	4.0000e-005		2.6000e-003	2.6000e-003		2.3900e-003	2.3900e-003	0.0000	3.8323	3.8323	1.1700e-003	0.0000	3.8616
Total	**4.6400e-003**	**0.0523**	**0.0216**	**4.0000e-005**	**5.6000e-003**	**2.6000e-003**	**8.2000e-003**	**2.8800e-003**	**2.3900e-003**	**5.2700e-003**	**0.0000**	**3.8323**	**3.8323**	**1.1700e-003**	**0.0000**	**3.8616**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	9.0000e-005	8.0000e-005	7.4000e-004	0.0000	1.6000e-004	0.0000	1.6000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.1588	0.1588	1.0000e-005	0.0000	0.1590
Total	**9.0000e-005**	**8.0000e-005**	**7.4000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**0.0000**	**0.1588**	**0.1588**	**1.0000e-005**	**0.0000**	**0.1590**

3.5 Paving - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					

Off-Road	8.2900e-003	0.0834	0.0611	9.0000e-005		5.1700e-003	5.1700e-003		4.7600e-003	4.7600e-003	0.0000	8.1750	8.1750	2.4600e-003	0.0000	8.2364
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.2900e-003**	**0.0834**	**0.0611**	**9.0000e-005**		**5.1700e-003**	**5.1700e-003**		**4.7600e-003**	**4.7600e-003**	**0.0000**	**8.1750**	**8.1750**	**2.4600e-003**	**0.0000**	**8.2364**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.9000e-004	2.7600e-003	1.0000e-005	6.0000e-004	0.0000	6.1000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.5956	0.5956	2.0000e-005	0.0000	0.5961
Total	**3.5000e-004**	**2.9000e-004**	**2.7600e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.1000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.5956**	**0.5956**	**2.0000e-005**	**0.0000**	**0.5961**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	8.2900e-003	0.0834	0.0611	9.0000e-005		5.1700e-003	5.1700e-003		4.7600e-003	4.7600e-003	0.0000	8.1749	8.1749	2.4600e-003	0.0000	8.2364
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**8.2900e-003**	**0.0834**	**0.0611**	**9.0000e-005**		**5.1700e-003**	**5.1700e-003**		**4.7600e-003**	**4.7600e-003**	**0.0000**	**8.1749**	**8.1749**	**2.4600e-003**	**0.0000**	**8.2364**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.9000e-004	2.7600e-003	1.0000e-005	6.0000e-004	0.0000	6.1000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.5956	0.5956	2.0000e-005	0.0000	0.5961
Total	**3.5000e-004**	**2.9000e-004**	**2.7600e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.1000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.5956**	**0.5956**	**2.0000e-005**	**0.0000**	**0.5961**

3.6 Demolition - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0199	0.0000	0.0199	3.0200e-003	0.0000	3.0200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0276	0.2676	0.1556	2.4000e-004		0.0165	0.0165		0.0154	0.0154	0.0000	21.9668	21.9668	5.5600e-003	0.0000	22.1057
Total	**0.0276**	**0.2676**	**0.1556**	**2.4000e-004**	**0.0199**	**0.0165**	**0.0364**	**3.0200e-003**	**0.0154**	**0.0184**	**0.0000**	**21.9668**	**21.9668**	**5.5600e-003**	**0.0000**	**22.1057**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.9000e-004	0.0322	6.5500e-003	7.0000e-005	1.5600e-003	1.8000e-004	1.7400e-003	4.3000e-004	1.7000e-004	6.0000e-004	0.0000	7.2333	7.2333	6.6000e-004	0.0000	7.2497
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.1000e-004	5.0000e-004	4.7800e-003	1.0000e-005	1.0400e-003	1.0000e-005	1.0500e-003	2.8000e-004	1.0000e-005	2.8000e-004	0.0000	1.0323	1.0323	4.0000e-005	0.0000	1.0333
Total	**1.6000e-003**	**0.0327**	**0.0113**	**8.0000e-005**	**2.6000e-003**	**1.9000e-004**	**2.7900e-003**	**7.1000e-004**	**1.8000e-004**	**8.8000e-004**	**0.0000**	**8.2656**	**8.2656**	**7.0000e-004**	**0.0000**	**8.2830**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					8.5200e-003	0.0000	8.5200e-003	1.2900e-003	0.0000	1.2900e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0276	0.2676	0.1556	2.4000e-004		0.0165	0.0165		0.0154	0.0154	0.0000	21.9668	21.9668	5.5600e-003	0.0000	22.1057
Total	**0.0276**	**0.2676**	**0.1556**	**2.4000e-004**	**8.5200e-003**	**0.0165**	**0.0250**	**1.2900e-003**	**0.0154**	**0.0167**	**0.0000**	**21.9668**	**21.9668**	**5.5600e-003**	**0.0000**	**22.1057**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	9.9000e-004	0.0322	6.5500e-003	7.0000e-005	1.5600e-003	1.8000e-004	1.7400e-003	4.3000e-004	1.7000e-004	6.0000e-004	0.0000	7.2333	7.2333	6.6000e-004	0.0000	7.2497

Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.1000e-004	5.0000e-004	4.7800e-003	1.0000e-005	1.0400e-003	1.0000e-005	1.0500e-003	2.8000e-004	1.0000e-005	2.8000e-004	0.0000	1.0323	1.0323	4.0000e-005	0.0000	1.0333
Total	**1.6000e-003**	**0.0327**	**0.0113**	**8.0000e-005**	**2.6000e-003**	**1.9000e-004**	**2.7900e-003**	**7.1000e-004**	**1.8000e-004**	**8.8000e-004**	**0.0000**	**8.2656**	**8.2656**	**7.0000e-004**	**0.0000**	**8.2830**

4.0 Operational Detail - Mobile

A-3 Overlay Operational Scenarios - Emissions Calculations and Model Output

City of Oceanside Overlay Project

Air Quality and Greenhouse Gas Assessment

Greenhouse Gas Emissions Analysis: Example Development Scenarios

CalEEMod Run Scenario	Example Land Use Type	Land Use Units	GHG Emissions MTCO2e per Year	Scaled Land Use Units	Scaled GHG Emissions MTCO2e per Year
Example Single-Use Project with NET INCREASE over Existing Conditions for the Following Land Uses:					
Residential 1	Apartment Mid-Rise	10 DU	121	66 DU	799
Commercial 1	Fast Food Restaurant w/Drive Through	1,000 sf	273	2,930 sf	800
Commercial 2	High-Turnover Sit Down Restaurant	1,000 sf	99	8,080 sf	800
Commercial 3	Strip Mall Retail	1,000 sf	34	23,500 sf	799
Commercial 4	General Office Building	1,000 sf	16	50,000 sf	800
Example Mixed-Use Project with NET INCREASE over Existing Conditions for the Following Land Uses:					
Residential 1	Apartment Mid-Rise			25 DU	303
Commercial 1	Fast Food Restaurant w/Drive Through			1,400 sf	382
Commercial 3	Strip Mall Retail			3,350 sf	114
				Total:	**799**
Residential 1	Apartment Mid-Rise			30 DU	363
Commercial 2	High-Turnover Sit Down Restaurant			2,800 sf	277
Commercial 4	General Office Building			10,000 sf	160
				Total:	**800**

Note:

Amortized construction-related GHG emissions are conservatively assumed to contribute 100 MTCO2e per year or less, when amortized over a project lifetime of 30 years, which is consistent for typical land use development projects where amortized construction GHG emissions contribute less than 5% of annual GHG emissions.

Oceanside Operations Overlay - Residential

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Apartments Mid Rise	10.00	Dwelling Unit	0.26	10,000.00	29

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Residential Scenario Model Run for +10 net increase in DU

Energy Use - Title 24 (2016) Compliance. Residential reduction of 28%, Nonresidential reduction of 5% compared to prior 2013 standards. Source: CEC, 2016 Building Energy Efficiency Standards, Adoption Hearing, June 10, 2015.
Solid Waste - Solid Waste default assumptions of 6% no capture, 94% flare, 0% energy recovery.

Mobile Land Use Mitigation -

Water Mitigation - Water Efficient indoor fixtures and outdoor landscaping irrigation requried per Title 24 and CALGreen requirements.

Waste Mitigation - 62% waste diversion. Source: County of San Diego, Strategic Plan to Reduce Waste, October 2016.

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	741.44	533.84
tblEnergyUse	T24E	246.93	177.79
tblEnergyUse	T24NG	4,687.93	3,375.36

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.6845	0.0131	0.8493	1.4100e-003		0.1090	0.1090		0.1090	0.1090	10.3296	4.4534	14.7829	9.6500e-003	8.1000e-004	15.2664
Energy	4.1000e-004	3.4800e-003	1.4800e-003	2.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004	0.0000	17.0672	17.0672	6.0000e-004	1.8000e-004	17.1366
Mobile	0.0256	0.1119	0.3089	8.9000e-004	0.0700	1.0700e-003	0.0710	0.0187	1.0000e-003	0.0198	0.0000	81.8353	81.8353	4.7900e-003	0.0000	81.9550
Waste						0.0000	0.0000		0.0000	0.0000	0.9338	0.0000	0.9338	0.0552	0.0000	2.3134
Water						0.0000	0.0000		0.0000	0.0000	0.2067	4.2639	4.4706	0.0214	5.4000e-004	5.1657
Total	**0.7105**	**0.1285**	**1.1597**	**2.3200e-003**	**0.0700**	**0.1104**	**0.1803**	**0.0187**	**0.1103**	**0.1290**	**11.4700**	**107.6198**	**119.0899**	**0.0916**	**1.5300e-003**	**121.8371**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.6845	0.0131	0.8493	1.4100e-003		0.1090	0.1090		0.1090	0.1090	10.3296	4.4534	14.7829	9.6500e-003	8.1000e-004	15.2664
Energy	4.1000e-004	3.4800e-003	1.4800e-003	2.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004	0.0000	17.0672	17.0672	6.0000e-004	1.8000e-004	17.1366
Mobile	0.0258	0.1128	0.3119	9.0000e-004	0.0709	1.0800e-003	0.0720	0.0190	1.0200e-003	0.0200	0.0000	82.8351	82.8351	4.8400e-003	0.0000	82.9560
Waste						0.0000	0.0000		0.0000	0.0000	0.3548	0.0000	0.3548	0.0210	0.0000	0.8791
Water						0.0000	0.0000		0.0000	0.0000	0.1654	3.6185	3.7838	0.0171	4.3000e-004	4.3406
Total	**0.7107**	**0.1294**	**1.1627**	**2.3300e-003**	**0.0709**	**0.1104**	**0.1812**	**0.0190**	**0.1103**	**0.1293**	**10.8498**	**107.9741**	**118.8239**	**0.0532**	**1.4200e-003**	**120.5787**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**-0.02**	**-0.75**	**-0.26**	**-0.43**	**-1.29**	**-0.01**	**-0.50**	**-1.33**	**-0.02**	**-0.19**	**5.41**	**-0.33**	**0.22**	**41.94**	**7.19**	**1.03**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0258	0.1128	0.3119	9.0000e-004	0.0709	1.0800e-003	0.0720	0.0190	1.0200e-003	0.0200	0.0000	82.8351	82.8351	4.8400e-003	0.0000	82.9560
Unmitigated	0.0256	0.1119	0.3089	8.9000e-004	0.0700	1.0700e-003	0.0710	0.0187	1.0000e-003	0.0198	0.0000	81.8353	81.8353	4.7900e-003	0.0000	81.9550

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments Mid Rise	66.50	63.90	58.60	185,595	187,988
Total	66.50	63.90	58.60	185,595	187,988

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-...	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Apartments Mid Rise	10.80	7.30	7.50	41.60	18.80	39.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments Mid Rise	0.574135	0.045525	0.189369	0.116519	0.019283	0.005646	0.014833	0.022073	0.001871	0.002173	0.006385	0.000739	0.001452

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	13.0354	13.0354	5.2000e-004	1.1000e-004	13.0809
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	13.0354	13.0354	5.2000e-004	1.1000e-004	13.0809
NaturalGas Mitigated	4.1000e-004	3.4800e-003	1.4800e-003	2.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004	0.0000	4.0318	4.0318	8.0000e-005	7.0000e-005	4.0558
NaturalGas Unmitigated	4.1000e-004	3.4800e-003	1.4800e-003	2.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004	0.0000	4.0318	4.0318	8.0000e-005	7.0000e-005	4.0558

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	75553.6	4.1000e-004	3.4800e-003	1.4800e-003	2.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004	0.0000	4.0318	4.0318	8.0000e-005	7.0000e-005	4.0558
Total		**4.1000e-004**	**3.4800e-003**	**1.4800e-003**	**2.0000e-005**		**2.8000e-004**	**2.8000e-004**		**2.8000e-004**	**2.8000e-004**	**0.0000**	**4.0318**	**4.0318**	**8.0000e-005**	**7.0000e-005**	**4.0558**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Apartments Mid Rise	75553.6	4.1000e-004	3.4800e-003	1.4800e-003	2.0000e-005		2.8000e-004	2.8000e-004		2.8000e-004	2.8000e-004	0.0000	4.0318	4.0318	8.0000e-005	7.0000e-005	4.0558
Total		**4.1000e-004**	**3.4800e-003**	**1.4800e-003**	**2.0000e-005**		**2.8000e-004**	**2.8000e-004**		**2.8000e-004**	**2.8000e-004**	**0.0000**	**4.0318**	**4.0318**	**8.0000e-005**	**7.0000e-005**	**4.0558**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	39886.9	13.0354	5.2000e-004	1.1000e-004	13.0809
Total		**13.0354**	**5.2000e-004**	**1.1000e-004**	**13.0809**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments Mid Rise	39886.9	13.0354	5.2000e-004	1.1000e-004	13.0809
Total		**13.0354**	**5.2000e-004**	**1.1000e-004**	**13.0809**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.6845	0.0131	0.8493	1.4100e-003		0.1090	0.1090		0.1090	0.1090	10.3296	4.4534	14.7829	9.6500e-003	8.1000e-004	15.2664
Unmitigated	0.6845	0.0131	0.8493	1.4100e-003		0.1090	0.1090		0.1090	0.1090	10.3296	4.4534	14.7829	9.6500e-003	8.1000e-004	15.2664

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0156					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0391					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.6275	0.0123	0.7745	1.4000e-003		0.1086	0.1086		0.1086	0.1086	10.3296	4.3321	14.6617	9.5300e-003	8.1000e-004	15.1421
Landscaping	2.3100e-003	8.7000e-004	0.0748	0.0000		4.1000e-004	4.1000e-004		4.1000e-004	4.1000e-004	0.0000	0.1213	0.1213	1.2000e-004	0.0000	0.1243
Total	**0.6845**	**0.0131**	**0.8493**	**1.4000e-003**		**0.1090**	**0.1090**		**0.1090**	**0.1090**	**10.3296**	**4.4534**	**14.7829**	**9.6500e-003**	**8.1000e-004**	**15.2664**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0156					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0391					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.6275	0.0123	0.7745	1.4000e-003		0.1086	0.1086		0.1086	0.1086	10.3296	4.3321	14.6617	9.5300e-003	8.1000e-004	15.1421
Landscaping	2.3100e-003	8.7000e-004	0.0748	0.0000		4.1000e-004	4.1000e-004		4.1000e-004	4.1000e-004	0.0000	0.1213	0.1213	1.2000e-004	0.0000	0.1243
Total	**0.6845**	**0.0131**	**0.8493**	**1.4000e-003**		**0.1090**	**0.1090**		**0.1090**	**0.1090**	**10.3296**	**4.4534**	**14.7829**	**9.6500e-003**	**8.1000e-004**	**15.2664**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	3.7838	0.0171	4.3000e-004	4.3406
Unmitigated	4.4706	0.0214	5.4000e-004	5.1657

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	0.65154 / 0.410754	4.4706	0.0214	5.4000e-004	5.1657
Total		**4.4706**	**0.0214**	**5.4000e-004**	**5.1657**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments Mid Rise	0.521232 / 0.385698	3.7838	0.0171	4.3000e-004	4.3406
Total		**3.7838**	**0.0171**	**4.3000e-004**	**4.3406**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.3548	0.0210	0.0000	0.8791
Unmitigated	0.9338	0.0552	0.0000	2.3134

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	4.6	0.9338	0.0552	0.0000	2.3134
Total		**0.9338**	**0.0552**	**0.0000**	**2.3134**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments Mid Rise	1.748	0.3548	0.0210	0.0000	0.8791
Total		**0.3548**	**0.0210**	**0.0000**	**0.8791**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Oceanside Operations Overlay - Commercial 1

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Fast Food Restaurant with Drive Thru	1.00	1000sqft	0.02	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Commercial 1 Scenario Model Run for +1,000 sf net increase for Fast Food Restaurant

Energy Use - Title 24 (2016) Compliance. Residential reduction of 28%, Nonresidential reduction of 5% compared to prior 2013 standards. Source: CEC, 2016 Building Energy Efficiency Standards, Adoption Hearing, June 10, 2015.

Mobile Land Use Mitigation -

Water Mitigation - Water Efficient indoor fixtures and outdoor landscaping irrigation requried per Title 24 and CALGreen requirements.

Waste Mitigation - 62% waste diversion. Source: County of San Diego, Strategic Plan to Reduce Waste, October 2016.

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	6.97	6.62
tblEnergyUse	T24E	8.63	8.20
tblEnergyUse	T24NG	36.10	34.30

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	21.8045	21.8045	6.8000e-004	2.7000e-004	21.9032
Mobile	0.1492	0.5108	1.2350	2.6600e-003	0.1885	3.3500e-003	0.1918	0.0505	3.1600e-003	0.0536	0.0000	244.2428	244.2428	0.0182	0.0000	244.6980
Waste						0.0000	0.0000		0.0000	0.0000	2.3385	0.0000	2.3385	0.1382	0.0000	5.7934
Water						0.0000	0.0000		0.0000	0.0000	0.0963	1.3620	1.4583	9.9500e-003	2.4000e-004	1.7799
Total	**0.1552**	**0.5193**	**1.2422**	**2.7100e-003**	**0.1885**	**3.9900e-003**	**0.1925**	**0.0505**	**3.8000e-003**	**0.0543**	**2.4348**	**267.4094**	**269.8441**	**0.1670**	**5.1000e-004**	**274.1746**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	21.8045	21.8045	6.8000e-004	2.7000e-004	21.9032
Mobile	0.1496	0.5134	1.2432	2.6900e-003	0.1909	3.3900e-003	0.1943	0.0511	3.1900e-003	0.0543	0.0000	246.9357	246.9357	0.0183	0.0000	247.3942
Waste						0.0000	0.0000		0.0000	0.0000	0.8886	0.0000	0.8886	0.0525	0.0000	2.2015
Water						0.0000	0.0000		0.0000	0.0000	0.0770	1.0994	1.1764	7.9600e-003	2.0000e-004	1.4337
Total	**0.1556**	**0.5219**	**1.2504**	**2.7400e-003**	**0.1909**	**4.0300e-003**	**0.1949**	**0.0511**	**3.8300e-003**	**0.0550**	**0.9657**	**269.8396**	**270.8053**	**0.0795**	**4.7000e-004**	**272.9327**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**-0.25**	**-0.49**	**-0.66**	**-1.11**	**-1.29**	**-1.00**	**-1.28**	**-1.29**	**-0.79**	**-1.27**	**60.34**	**-0.91**	**-0.36**	**52.41**	**7.84**	**0.45**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.1496	0.5134	1.2432	2.6900e-003	0.1909	3.3900e-003	0.1943	0.0511	3.1900e-003	0.0543	0.0000	246.9357	246.9357	0.0183	0.0000	247.3942
Unmitigated	0.1492	0.5108	1.2350	2.6600e-003	0.1885	3.3500e-003	0.1918	0.0505	3.1600e-003	0.0536	0.0000	244.2428	244.2428	0.0182	0.0000	244.6980

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Fast Food Restaurant with Drive Thru	496.12	722.03	542.72	499,911	506,357
Total	496.12	722.03	542.72	499,911	506,357

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Fast Food Restaurant with Drive Thru	9.50	7.30	7.30	2.20	78.80	19.00	29	21	50

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Fast Food Restaurant with Drive Thru	0.574135	0.045525	0.189369	0.116519	0.019283	0.005646	0.014833	0.022073	0.001871	0.002173	0.006385	0.000739	0.001452

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	12.5854	12.5854	5.1000e-004	1.0000e-004	12.6293
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	12.5854	12.5854	5.1000e-004	1.0000e-004	12.6293
NaturalGas Mitigated	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	9.2191	9.2191	1.8000e-004	1.7000e-004	9.2739
NaturalGas Unmitigated	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	9.2191	9.2191	1.8000e-004	1.7000e-004	9.2739

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Fast Food Restaurant with Drive Thru	172760	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	9.2191	9.2191	1.8000e-004	1.7000e-004	9.2739
Total		**9.3000e-004**	**8.4700e-003**	**7.1100e-003**	**5.0000e-005**		**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**	**0.0000**	**9.2191**	**9.2191**	**1.8000e-004**	**1.7000e-004**	**9.2739**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Fast Food Restaurant with Drive Thru	172760	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	9.2191	9.2191	1.8000e-004	1.7000e-004	9.2739
Total		**9.3000e-004**	**8.4700e-003**	**7.1100e-003**	**5.0000e-005**		**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**	**0.0000**	**9.2191**	**9.2191**	**1.8000e-004**	**1.7000e-004**	**9.2739**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Fast Food Restaurant with Drive Thru	38510	12.5854	5.1000e-004	1.0000e-004	12.6293
Total		**12.5854**	**5.1000e-004**	**1.0000e-004**	**12.6293**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Fast Food Restaurant with Drive Thru	38510	12.5854	5.1000e-004	1.0000e-004	12.6293
Total		**12.5854**	**5.1000e-004**	**1.0000e-004**	**12.6293**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**5.0700e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**5.0700e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	1.1764	7.9600e-003	2.0000e-004	1.4337
Unmitigated	1.4583	9.9500e-003	2.4000e-004	1.7799

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Fast Food Restaurant with Drive Thru	0.303534 / 0.0193745	1.4583	9.9500e-003	2.4000e-004	1.7799
Total		**1.4583**	**9.9500e-003**	**2.4000e-004**	**1.7799**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Fast Food Restaurant with Drive Thru	0.242827 / 0.0181926	1.1764	7.9600e-003	2.0000e-004	1.4337
Total		**1.1764**	**7.9600e-003**	**2.0000e-004**	**1.4337**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.8886	0.0525	0.0000	2.2015
Unmitigated	2.3385	0.1382	0.0000	5.7934

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Fast Food Restaurant with Drive Thru	11.52	2.3385	0.1382	0.0000	5.7934
Total		**2.3385**	**0.1382**	**0.0000**	**5.7934**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Fast Food Restaurant with Drive Thru	4.3776	0.8886	0.0525	0.0000	2.2015
Total		**0.8886**	**0.0525**	**0.0000**	**2.2015**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Oceanside Operations Overlay - Commercial 2

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
High Turnover (Sit Down Restaurant)	1.00	1000sqft	0.02	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Commercial 2 Scenario Model Run for +1,000 sf net increase for High-Turnover Sit Down Restaurant

Energy Use - Title 24 (2016) Compliance. Residential reduction of 28%, Nonresidential reduction of 5% compared to prior 2013 standards. Source: CEC, 2016 Building Energy Efficiency Standards, Adoption Hearing, June 10, 2015.
Mobile Land Use Mitigation -

Water Mitigation - Water Efficient indoor fixtures and outdoor landscaping irrigation requried per Title 24 and CALGreen requirements.

Waste Mitigation - 62% waste diversion. Source: County of San Diego, Strategic Plan to Reduce Waste, October 2016.

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	6.97	6.62
tblEnergyUse	T24E	8.63	8.20
tblEnergyUse	T24NG	36.10	34.30

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	21.8045	21.8045	6.8000e-004	2.7000e-004	21.9032
Mobile	0.0387	0.1382	0.3434	7.9000e-004	0.0579	9.9000e-004	0.0589	0.0155	9.3000e-004	0.0164	0.0000	72.8698	72.8698	5.1200e-003	0.0000	72.9978
Waste						0.0000	0.0000		0.0000	0.0000	2.4156	0.0000	2.4156	0.1428	0.0000	5.9845
Water						0.0000	0.0000		0.0000	0.0000	0.0963	1.3620	1.4583	9.9500e-003	2.4000e-004	1.7799
Total	**0.0447**	**0.1467**	**0.3505**	**8.4000e-004**	**0.0579**	**1.6300e-003**	**0.0595**	**0.0155**	**1.5700e-003**	**0.0171**	**2.5119**	**96.0364**	**98.5483**	**0.1585**	**5.1000e-004**	**102.6655**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	21.8045	21.8045	6.8000e-004	2.7000e-004	21.9032
Mobile	0.0388	0.1390	0.3459	8.0000e-004	0.0586	1.0000e-003	0.0596	0.0157	9.4000e-004	0.0166	0.0000	73.6966	73.6966	5.1600e-003	0.0000	73.8256
Waste						0.0000	0.0000		0.0000	0.0000	0.9179	0.0000	0.9179	0.0543	0.0000	2.2741
Water						0.0000	0.0000		0.0000	0.0000	0.0770	1.0994	1.1764	7.9600e-003	2.0000e-004	1.4337
Total	**0.0448**	**0.1475**	**0.3530**	**8.5000e-004**	**0.0586**	**1.6400e-003**	**0.0603**	**0.0157**	**1.5800e-003**	**0.0173**	**0.9950**	**96.6005**	**97.5955**	**0.0681**	**4.7000e-004**	**99.4367**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**-0.27**	**-0.54**	**-0.72**	**-1.19**	**-1.30**	**-0.61**	**-1.28**	**-1.29**	**-0.64**	**-1.23**	**60.39**	**-0.59**	**0.97**	**57.07**	**7.84**	**3.14**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0388	0.1390	0.3459	8.0000e-004	0.0586	1.0000e-003	0.0596	0.0157	9.4000e-004	0.0166	0.0000	73.6966	73.6966	5.1600e-003	0.0000	73.8256
Unmitigated	0.0387	0.1382	0.3434	7.9000e-004	0.0579	9.9000e-004	0.0589	0.0155	9.3000e-004	0.0164	0.0000	72.8698	72.8698	5.1200e-003	0.0000	72.9978

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
High Turnover (Sit Down Restaurant)	127.15	158.37	131.84	153,480	155,459
Total	127.15	158.37	131.84	153,480	155,459

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
High Turnover (Sit Down Restaurant)	9.50	7.30	7.30	8.50	72.50	19.00	37	20	43

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
High Turnover (Sit Down Restaurant)	0.574135	0.045525	0.189369	0.116519	0.019283	0.005646	0.014833	0.022073	0.001871	0.002173	0.006385	0.000739	0.001452

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	12.5854	12.5854	5.1000e-004	1.0000e-004	12.6293
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	12.5854	12.5854	5.1000e-004	1.0000e-004	12.6293
NaturalGas Mitigated	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	9.2191	9.2191	1.8000e-004	1.7000e-004	9.2739
NaturalGas Unmitigated	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	9.2191	9.2191	1.8000e-004	1.7000e-004	9.2739

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
High Turnover (Sit Down Restaurant)	172760	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	9.2191	9.2191	1.8000e-004	1.7000e-004	9.2739
Total		**9.3000e-004**	**8.4700e-003**	**7.1100e-003**	**5.0000e-005**		**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**	**0.0000**	**9.2191**	**9.2191**	**1.8000e-004**	**1.7000e-004**	**9.2739**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
High Turnover (Sit Down Restaurant)	172760	9.3000e-004	8.4700e-003	7.1100e-003	5.0000e-005		6.4000e-004	6.4000e-004		6.4000e-004	6.4000e-004	0.0000	9.2191	9.2191	1.8000e-004	1.7000e-004	9.2739
Total		**9.3000e-004**	**8.4700e-003**	**7.1100e-003**	**5.0000e-005**		**6.4000e-004**	**6.4000e-004**		**6.4000e-004**	**6.4000e-004**	**0.0000**	**9.2191**	**9.2191**	**1.8000e-004**	**1.7000e-004**	**9.2739**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
High Turnover (Sit Down Restaurant)	38510	12.5854	5.1000e-004	1.0000e-004	12.6293
Total		**12.5854**	**5.1000e-004**	**1.0000e-004**	**12.6293**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
High Turnover (Sit Down Restaurant)	38510	12.5854	5.1000e-004	1.0000e-004	12.6293
Total		**12.5854**	**5.1000e-004**	**1.0000e-004**	**12.6293**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**5.0700e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**5.0700e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	1.1764	7.9600e-003	2.0000e-004	1.4337
Unmitigated	1.4583	9.9500e-003	2.4000e-004	1.7799

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
High Turnover (Sit Down Restaurant)	0.303534 / 0.0193745	1.4583	9.9500e-003	2.4000e-004	1.7799
Total		**1.4583**	**9.9500e-003**	**2.4000e-004**	**1.7799**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
High Turnover (Sit Down Restaurant)	0.242827 / 0.0181926	1.1764	7.9600e-003	2.0000e-004	1.4337
Total		**1.1764**	**7.9600e-003**	**2.0000e-004**	**1.4337**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.9179	0.0543	0.0000	2.2741
Unmitigated	2.4156	0.1428	0.0000	5.9845

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
High Turnover (Sit Down Restaurant)	11.9	2.4156	0.1428	0.0000	5.9845
Total		**2.4156**	**0.1428**	**0.0000**	**5.9845**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
High Turnover (Sit Down Restaurant)	4.522	0.9179	0.0543	0.0000	2.2741
Total		**0.9179**	**0.0543**	**0.0000**	**2.2741**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Oceanside Operations Overlay - Commercial 3

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Strip Mall	1.00	1000sqft	0.02	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Commercial 3 Scenario Model Run for +1,000 sf net increase for Strip Mall Retail.

Energy Use - Title 24 (2016) Compliance. Residential reduction of 28%, Nonresidential reduction of 5% compared to prior 2013 standards. Source: CEC, 2016 Building Energy Efficiency Standards, Adoption Hearing, June 10, 2015.

Mobile Land Use Mitigation -

Water Mitigation - Water Efficient indoor fixtures and outdoor landscaping irrigation requried per Title 24 and CALGreen requirements.

Waste Mitigation - 62% waste diversion. Source: County of San Diego, Strategic Plan to Reduce Waste, October 2016.

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	6.39	6.07
tblEnergyUse	T24E	3.34	3.17
tblEnergyUse	T24NG	1.15	1.09

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	1.0000e-005	1.1000e-004	9.0000e-005	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.1688	4.1688	1.7000e-004	4.0000e-005	4.1836
Mobile	0.0128	0.0486	0.1249	3.1000e-004	0.0236	3.8000e-004	0.0240	6.3100e-003	3.6000e-004	6.6700e-003	0.0000	28.7937	28.7937	1.8900e-003	0.0000	28.8409
Waste						0.0000	0.0000		0.0000	0.0000	0.2131	0.0000	0.2131	0.0126	0.0000	0.5281
Water						0.0000	0.0000		0.0000	0.0000	0.0235	0.4800	0.5035	2.4300e-003	6.0000e-005	0.5825
Total	**0.0179**	**0.0487**	**0.1250**	**3.1000e-004**	**0.0236**	**3.9000e-004**	**0.0240**	**6.3100e-003**	**3.7000e-004**	**6.6800e-003**	**0.2366**	**33.4426**	**33.6792**	**0.0171**	**1.0000e-004**	**34.1351**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	1.0000e-005	1.1000e-004	9.0000e-005	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.1688	4.1688	1.7000e-004	4.0000e-005	4.1836
Mobile	0.0128	0.0489	0.1260	3.2000e-004	0.0239	3.9000e-004	0.0243	6.3900e-003	3.7000e-004	6.7600e-003	0.0000	29.1304	29.1304	1.9000e-003	0.0000	29.1780
Waste						0.0000	0.0000		0.0000	0.0000	0.2131	0.0000	0.2131	0.0126	0.0000	0.5281
Water						0.0000	0.0000		0.0000	0.0000	0.0188	0.4070	0.4258	1.9500e-003	5.0000e-005	0.4890
Total	**0.0179**	**0.0490**	**0.1261**	**3.2000e-004**	**0.0239**	**4.0000e-004**	**0.0243**	**6.3900e-003**	**3.8000e-004**	**6.7700e-003**	**0.2319**	**33.7061**	**33.9381**	**0.0166**	**9.0000e-005**	**34.3787**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**-0.28**	**-0.66**	**-0.82**	**-3.23**	**-1.32**	**-2.56**	**-1.25**	**-1.27**	**-2.70**	**-1.35**	**1.99**	**-0.79**	**-0.77**	**2.75**	**10.00**	**-0.71**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0128	0.0489	0.1260	3.2000e-004	0.0239	3.9000e-004	0.0243	6.3900e-003	3.7000e-004	6.7600e-003	0.0000	29.1304	29.1304	1.9000e-003	0.0000	29.1780
Unmitigated	0.0128	0.0486	0.1249	3.1000e-004	0.0236	3.8000e-004	0.0240	6.3100e-003	3.6000e-004	6.6700e-003	0.0000	28.7937	28.7937	1.8900e-003	0.0000	28.8409

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Strip Mall	44.32	42.04	20.43	62,497	63,303
Total	44.32	42.04	20.43	62,497	63,303

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-...	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Strip Mall	0.574135	0.045525	0.189369	0.116519	0.019283	0.005646	0.014833	0.022073	0.001871	0.002173	0.006385	0.000739	0.001452

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4.0524	4.0524	1.6000e-004	3.0000e-005	4.0666
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4.0524	4.0524	1.6000e-004	3.0000e-005	4.0666
NaturalGas Mitigated	1.0000e-005	1.1000e-004	9.0000e-005	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	0.1163	0.1163	0.0000	0.0000	0.1170
NaturalGas Unmitigated	1.0000e-005	1.1000e-004	9.0000e-005	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	0.1163	0.1163	0.0000	0.0000	0.1170

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Strip Mall	2180	1.0000e-005	1.1000e-004	9.0000e-005	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	0.1163	0.1163	0.0000	0.0000	0.1170
Total		**1.0000e-005**	**1.1000e-004**	**9.0000e-005**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.1163**	**0.1163**	**0.0000**	**0.0000**	**0.1170**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Strip Mall	2180	1.0000e-005	1.1000e-004	9.0000e-005	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	0.1163	0.1163	0.0000	0.0000	0.1170
Total		**1.0000e-005**	**1.1000e-004**	**9.0000e-005**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.1163**	**0.1163**	**0.0000**	**0.0000**	**0.1170**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Strip Mall	12400	4.0524	1.6000e-004	3.0000e-005	4.0666
Total		**4.0524**	**1.6000e-004**	**3.0000e-005**	**4.0666**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Strip Mall	12400	4.0524	1.6000e-004	3.0000e-005	4.0666
Total		**4.0524**	**1.6000e-004**	**3.0000e-005**	**4.0666**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**5.0700e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**5.0700e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.4258	1.9500e-003	5.0000e-005	0.4890
Unmitigated	0.5035	2.4300e-003	6.0000e-005	0.5825

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Strip Mall	0.0740725 /	0.5035	2.4300e-003	6.0000e-005	0.5825
Total		**0.5035**	**2.4300e-003**	**6.0000e-005**	**0.5825**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Strip Mall	0.059258 / 0.0426299	0.4258	1.9500e-003	5.0000e-005	0.4890
Total		**0.4258**	**1.9500e-003**	**5.0000e-005**	**0.4890**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.2131	0.0126	0.0000	0.5281
Unmitigated	0.2131	0.0126	0.0000	0.5281

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Strip Mall	1.05	0.2131	0.0126	0.0000	0.5281
Total		**0.2131**	**0.0126**	**0.0000**	**0.5281**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Strip Mall	1.05	0.2131	0.0126	0.0000	0.5281
Total		**0.2131**	**0.0126**	**0.0000**	**0.5281**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Oceanside Operations Overlay - Commercial 4

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	1.00	1000sqft	0.02	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	720.49	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Commercial 4 Scenario Model Run for +1,000 sf net increase for General Office Building.

Energy Use - Title 24 (2016) Compliance. Residential reduction of 28%, Nonresidential reduction of 5% compared to prior 2013 standards. Source: CEC, 2016 Building Energy Efficiency Standards, Adoption Hearing, June 10, 2015.
Mobile Land Use Mitigation -

Water Mitigation - Water Efficient indoor fixtures and outdoor landscaping irrigation requried per Title 24 and CALGreen requirements.

Waste Mitigation - 62% waste diversion. Source: County of San Diego, Strategic Plan to Reduce Waste, October 2016.

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	3.91	3.71
tblEnergyUse	T24E	4.88	4.64
tblEnergyUse	T24NG	16.07	15.27

2.0 Emissions Summary

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	1.0000e-004	9.5000e-004	8.0000e-004	1.0000e-005		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005	0.0000	5.3921	5.3921	2.0000e-004	6.0000e-005	5.4134
Mobile	3.0700e-003	0.0129	0.0349	1.0000e-004	7.5500e-003	1.2000e-004	7.6700e-003	2.0200e-003	1.1000e-004	2.1300e-003	0.0000	8.9206	8.9206	5.4000e-004	0.0000	8.9341
Waste						0.0000	0.0000		0.0000	0.0000	0.1888	0.0000	0.1888	0.0112	0.0000	0.4677
Water						0.0000	0.0000		0.0000	0.0000	0.0564	1.1519	1.2082	5.8400e-003	1.5000e-004	1.3978
Total	**8.2400e-003**	**0.0138**	**0.0357**	**1.1000e-004**	**7.5500e-003**	**1.9000e-004**	**7.7400e-003**	**2.0200e-003**	**1.8000e-004**	**2.2000e-003**	**0.2452**	**15.4646**	**15.7097**	**0.0177**	**2.1000e-004**	**16.2130**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Energy	1.0000e-004	9.5000e-004	8.0000e-004	1.0000e-005		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005	0.0000	5.3921	5.3921	2.0000e-004	6.0000e-005	5.4134
Mobile	3.0900e-003	0.0130	0.0352	1.0000e-004	7.6500e-003	1.2000e-004	7.7700e-003	2.0500e-003	1.1000e-004	2.1600e-003	0.0000	9.0285	9.0285	5.4000e-004	0.0000	9.0421
Waste						0.0000	0.0000		0.0000	0.0000	0.0717	0.0000	0.0717	4.2400e-003	0.0000	0.1777
Water						0.0000	0.0000		0.0000	0.0000	0.0451	0.9765	1.0216	4.6700e-003	1.2000e-004	1.1734
Total	**8.2600e-003**	**0.0139**	**0.0360**	**1.1000e-004**	**7.6500e-003**	**1.9000e-004**	**7.8400e-003**	**2.0500e-003**	**1.8000e-004**	**2.2300e-003**	**0.1169**	**15.3971**	**15.5139**	**9.6500e-003**	**1.8000e-004**	**15.8066**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**-0.24**	**-0.72**	**-0.93**	**0.00**	**-1.32**	**0.00**	**-1.29**	**-1.49**	**0.00**	**-1.36**	**52.34**	**0.44**	**1.25**	**45.60**	**14.29**	**2.51**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	3.0900e-003	0.0130	0.0352	1.0000e-004	7.6500e-003	1.2000e-004	7.7700e-003	2.0500e-003	1.1000e-004	2.1600e-003	0.0000	9.0285	9.0285	5.4000e-004	0.0000	9.0421
Unmitigated	3.0700e-003	0.0129	0.0349	1.0000e-004	7.5500e-003	1.2000e-004	7.6700e-003	2.0200e-003	1.1000e-004	2.1300e-003	0.0000	8.9206	8.9206	5.4000e-004	0.0000	8.9341

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Office Building	11.03	2.46	1.05	20,026	20,284
Total	11.03	2.46	1.05	20,026	20,284

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Office Building	0.574135	0.045525	0.189369	0.116519	0.019283	0.005646	0.014833	0.022073	0.001871	0.002173	0.006385	0.000739	0.001452

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4.3531	4.3531	1.8000e-004	4.0000e-005	4.3683
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	4.3531	4.3531	1.8000e-004	4.0000e-005	4.3683
NaturalGas Mitigated	1.0000e-004	9.5000e-004	8.0000e-004	1.0000e-005		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005	0.0000	1.0390	1.0390	2.0000e-005	2.0000e-005	1.0452
NaturalGas Unmitigated	1.0000e-004	9.5000e-004	8.0000e-004	1.0000e-005		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005	0.0000	1.0390	1.0390	2.0000e-005	2.0000e-005	1.0452

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	19470	1.0000e-004	9.5000e-004	8.0000e-004	1.0000e-005		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005	0.0000	1.0390	1.0390	2.0000e-005	2.0000e-005	1.0452
Total		**1.0000e-004**	**9.5000e-004**	**8.0000e-004**	**1.0000e-005**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**	**0.0000**	**1.0390**	**1.0390**	**2.0000e-005**	**2.0000e-005**	**1.0452**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Office Building	19470	1.0000e-004	9.5000e-004	8.0000e-004	1.0000e-005		7.0000e-005	7.0000e-005		7.0000e-005	7.0000e-005	0.0000	1.0390	1.0390	2.0000e-005	2.0000e-005	1.0452
Total		**1.0000e-004**	**9.5000e-004**	**8.0000e-004**	**1.0000e-005**		**7.0000e-005**	**7.0000e-005**		**7.0000e-005**	**7.0000e-005**	**0.0000**	**1.0390**	**1.0390**	**2.0000e-005**	**2.0000e-005**	**1.0452**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	13320	4.3531	1.8000e-004	4.0000e-005	4.3683
Total		**4.3531**	**1.8000e-004**	**4.0000e-005**	**4.3683**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Office Building	13320	4.3531	1.8000e-004	4.0000e-005	4.3683
Total		**4.3531**	**1.8000e-004**	**4.0000e-005**	**4.3683**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Unmitigated	5.0700e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**5.0700e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1600e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.9100e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	2.0000e-005
Total	**5.0700e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**2.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

Install Low Flow Bathroom Faucet

Install Low Flow Kitchen Faucet

Install Low Flow Toilet

Install Low Flow Shower

Use Water Efficient Irrigation System

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	1.0216	4.6700e-003	1.2000e-004	1.1734
Unmitigated	1.2082	5.8400e-003	1.5000e-004	1.3978

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.177734 / 0.108934	1.2082	5.8400e-003	1.5000e-004	1.3978
Total		**1.2082**	**5.8400e-003**	**1.5000e-004**	**1.3978**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Office Building	0.142187 / 0.102289	1.0216	4.6700e-003	1.2000e-004	1.1734
Total		**1.0216**	**4.6700e-003**	**1.2000e-004**	**1.1734**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0717	4.2400e-003	0.0000	0.1777
Unmitigated	0.1888	0.0112	0.0000	0.4677

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	0.93	0.1888	0.0112	0.0000	0.4677
Total		**0.1888**	**0.0112**	**0.0000**	**0.4677**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Office Building	0.3534	0.0717	4.2400e-003	0.0000	0.1777
Total		**0.0717**	**4.2400e-003**	**0.0000**	**0.1777**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

City of Oceanside Overlay Project

Air Quality and Greenhouse Gas Assessment

Title 24 Energy Savings Adjustment

Nonresidential

% savings over Title 24 (2016)	% savings over Title 24 (2013)
0%	5.0%
5%	9.8%
10%	14.5%
15%	19.3%
20%	24.0%

Residential

% savings over Title 24 (2016)	% savings over Title 24 (2013)
0%	28.0%
5%	31.6%
10%	35.2%
15%	38.8%
20%	42.4%

Energy Use Factors Adjustment

Nonresidential % savings over Title 24 (2013) =	5.0%
Residential % savings over Title 24 (2013) =	28.0%

	T24 Electricity	NT24 Electricity	Lighting Electricity	T24 NG	NT24 NG
Title 24 (2013 - CalEEMod Default)					
Apartments Mid Rise	246.93	3,277.06	741.44	4,688.00	4,180.00
Fast Food w/ Drive-Through	8.63	23.69	6.97	36.10	138.46
High-Turnover Sit Down Rest.	8.63	23.69	6.97	36.10	138.46
Strip Mall (Retail)	3.34	3.16	6.39	1.15	1.09
General Office Building	4.88	4.97	3.91	16.07	4.20
Title 24 (2016)					
Apartments High Rise	177.79	3,277.06	533.84	3,375.36	4,180.00
Fast Food w/ Drive-Through	8.20	23.69	6.62	34.30	138.46
High-Turnover Sit Down Rest.	8.20	23.69	6.62	34.30	138.46
Strip Mall (Retail)	3.17	3.16	6.07	1.09	1.09
General Office Building	4.64	4.97	3.71	15.27	4.20

Sources:

CalEEMod Version 2016.3.1.

California Energy Commission, 2016 Building Energy Efficiency Standards, Adoption Hearing, June 10, 2015.

Appendix D

Biological Resources Technical Report

ESA

Final

OCEANSIDE COAST HIGHWAY CORRIDOR STUDY PROJECT

Biological Technical Report

Prepared for
City of Oceanside

February 2017

ESA



Final

OCEANSIDE COAST HIGHWAY CORRIDOR STUDY PROJECT

Biological Technical Report

Prepared for
City of Oceanside

February 2017

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Oceanside Coast Highway Corridor Study Project

Biological Technical Report

1. Introduction

This biological technical report describes an assessment of biological resources conducted in support of the Coast Highway Corridor Study Project (proposed project, or project). The project involves Complete Streets improvements proposed by the City of Oceanside (City) throughout the Coast Highway corridor as well as an amendment to the Zoning Ordinance to create a Coast Highway Incentive District (Incentive District). The Incentive District boundaries were not finalized when this biological technical report was initiated. For this reason, a larger Incentive District review area was assessed, which encompasses the final Incentive District boundaries. This report includes an assessment of biological resources impacts for the Complete Streets improvements and provides an overview of biological resources within the Incentive District.

2. Project Description

The proposed project consists of two components: Complete Streets improvements, analyzed at a project-level, and an Incentive District, which is analyzed programmatically (Figure 1). The Complete Streets improvements span approximately 3.5 miles from the northern terminus of Coast Highway at Harbor Drive to Eaton Street near the City's southern boundary and would include enhancements to the existing roadway infrastructure as well as bicycle, pedestrian, and transit facilities throughout the corridor. These enhancements include making streetscape improvements (removing dead trees and replanting trees), repainting the road surface, adding crosswalks, adding bulbouts, and improving manholes and creating roundabouts at designated Study Intersections (Figure 2). The Incentive District would extend from Seagaze Drive to the north past Eaton Street to the south, and extend from Ditmar Street on the east to Pacific Street on the west. The Incentive District would provide optional regulations and standards that a developer or property owner may choose in lieu of the existing underlying zoning. If adopted, the Incentive District would be an optional zoning program that developers could choose to apply for new development or redevelopment within the Incentive District boundary. Implementation of the Incentive District would require amendments to the City's existing General Plan and Zoning Ordinance. It should be noted that when referring specifically to each project component, the terms "Complete Streets improvements" and "Incentive District review area"[1] will be used to

[1] Due to the boundaries of the Incentive District being in flux at the time of this report, the term "Incentive District review area" represents the larger area used to identify and analyze potential resources and impacts associated with the Incentive District.

describe the individual areas while the term “project area” will be used when referring to the combined area of both project components.

3. Regulatory Framework

3.1 Federal

Endangered Species Act (USC, Title 16, § 1531 through 1543)

The federal Endangered Species Act (FESA) and subsequent amendments provide guidance for the conservation of endangered and threatened species and the ecosystems upon which they depend. In addition, the FESA defines species as threatened or endangered and provides regulatory protection for listed species. The FESA also provides a program for the conservation and recovery of threatened and endangered species as well as the conservation of designated critical habitat that the U.S. Fish and Wildlife Service (USFWS) determines is required for the survival and recovery of these listed species.

Section 7 of the FESA requires federal agencies, in consultation and with assistance from the Secretary of the Interior or the Secretary of Commerce, as appropriate, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat for these species. The USFWS and National Marine Fisheries Service (NMFS) share responsibilities for administering the FESA. Regulations governing interagency cooperation under Section 7 are found in California Code of Regulations (CCR) Title 50, Part 402. The opinion issued at the conclusion of consultation will include a statement authorizing “take” (to harass, harm, pursue, hunt, wound, kill, etc.) that may occur incidental to an otherwise legal activity.

Section 9 lists those actions that are prohibited under the FESA. Although take of a listed species is prohibited, it is allowed when it is incidental to an otherwise legal activity. Section 9 prohibits take of listed species of fish, wildlife, and plants without special exemption. The definition of “harm” includes significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns related to breeding, feeding, or shelter. “Harass” is defined as actions that create the likelihood of injury to listed species by significantly disrupting normal behavioral patterns related to breeding, feeding, and shelter.

Section 10 provides a means whereby a nonfederal action with the potential to result in take of a listed species can be allowed under an incidental take permit. Application procedures are found at 50 Code of Federal Regulations (CFR) 13 and 17 for species under the jurisdiction of USFWS and 50 CFR 217, 220, and 222 for species under the jurisdiction of NMFS.

Migratory Bird Treaty Act (16 USC 703 through 711)

The Migratory Bird Treaty Act (MBTA) is the domestic law that affirms, or implements, a commitment by the United States to four international conventions (with Canada, Mexico, Japan, and Russia) for the protection of a shared migratory bird resource. The MBTA makes it unlawful at any time, by any means, or in any manner to pursue, hunt, take, capture, or kill migratory birds. The law also applies to the removal of nests occupied by migratory birds during the breeding

season. The MBTA makes it unlawful to take, pursue, molest, or disturb these species, their nests, or their eggs anywhere in the United States.

Federal Clean Water Act (33 USC 1251 through 1376)

The Clean Water Act (CWA) provides guidance for the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters. Section 401 requires a project operator to obtain a federal license or permit that allows activities resulting in a discharge to waters of the United States to obtain state certification, thereby ensuring that the discharge will comply with provisions of the CWA. The Regional Water Quality Control Board (RWQCB) administers the certification program in California. Section 402 establishes a permitting system for the discharge of any pollutant (except dredged or fill material) into waters of the United States. Section 404 establishes a permit program administered by the U.S. Army Corps of Engineers (USACE) that regulates the discharge of dredged or fill material into waters of the United States, including wetlands. The USACE implementing regulations are found at 33 CFR 320 and 330. Guidelines for implementation are referred to as the Section 404(b)(1) Guidelines, which were developed by the United States Environmental Protection Agency in conjunction with USACE (40 CFR 230). The guidelines allow the discharge of dredged or fill material into the aquatic system only if there is no practicable alternative that would have less adverse impacts.

Wetlands and Other Waters of the United States

Aquatic resources, including riparian areas, wetlands, and certain aquatic vegetation communities, are considered sensitive biological resources and can fall under the jurisdiction of several regulatory agencies. The USACE exerts jurisdiction over waters of the United States, including all waters that are subject to the ebb and flow of the tide; wetlands and other waters such as lakes, rivers, streams (including intermittent or ephemeral streams), mudflats, sandflats, sloughs, prairie potholes, vernal pools, wet meadows, playa lakes, or natural ponds; and tributaries of the above features. The extent of waters of the United States is generally defined as the portion that falls within the limits of the Ordinary High Water Mark (OHWM). Typically, the OHWM corresponds to the 5- to 7-year flood event.

Wetlands, including swamps, bogs, seasonal wetlands, seeps, marshes, and similar areas, are defined by USACE as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3[b]; 40 CFR 230.3[t]). Indicators of three wetland parameters (i.e., hydric soils, hydrophytic vegetation, and wetlands hydrology), as determined by field investigation, must be present for a site to be classified as a wetland by USACE (USACE 1987).

3.2 State

California Endangered Species Act – California Fish and Game Code § 2050 et seq.

The California Endangered Species Act (CESA) establishes the policy of the state to conserve, protect, restore, and enhance threatened or endangered species and their habitats. The CESA

mandates that state agencies should not approve projects that would jeopardize the continued existence of threatened or endangered species if reasonable and prudent alternatives are available that would avoid jeopardy. There are no state agency consultation procedures under the CESA. For projects that would affect a listed species under both the CESA and the FESA, compliance with the FESA would satisfy the CESA if the California Department of Fish and Wildlife (CDFW) determines that the federal incidental take authorization is "consistent" with the CESA under California Fish and Game Code Section 2080.1. For projects that would result in take of a species listed under the CESA only, the project operator would have to apply for a take permit under Section 2081(b).

California State Fish and Game Code § 1602

Under these sections of the California Fish and Game Code, the project operator is required to notify CDFW prior to any project that would divert, obstruct, or change the natural flow, bed, channel, or bank of any river, stream, or lake. Pursuant to the code, a "stream" is defined as a body of water that flows at least periodically, or intermittently, through a bed or channel having banks and supporting fish or other aquatic life. Based on this definition, a watercourse with surface or subsurface flows that supports or has supported riparian vegetation is a stream and is subject to CDFW jurisdiction. Altered or artificial watercourses valuable to fish and wildlife are subject to CDFW jurisdiction. CDFW also has jurisdiction over dry washes that carry water during storm events.

Preliminary notification and project review generally occur during the environmental process. When an existing fish or wildlife resource may be substantially adversely affected, CDFW is required to propose reasonable project changes to protect the resource. These modifications are formalized in a Streambed Alteration Agreement, which becomes part of the plans, specifications, and bid documents for the project.

California Fully Protected Species

California fully protected species are described in Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code. These statutes prohibit take or possession of fully protected species. The CDFW is unable to authorize incidental take of fully protected species when activities are proposed in areas inhabited by those species.

California State Fish and Game Code §§ 2080 and 2081

Section 2080 of the California Fish and Game Code states that "No person shall import into this state [California], export out of this state, or take, possess, purchase, or sell within this state, any species, or any part or product thereof, that the Commission [State Fish and Game Commission] determines to be an endangered species or threatened species, or attempt any of those acts, except as otherwise provided in this chapter, or the Native Plant Protection Act, or the California Desert Native Plants Act." Pursuant to Section 2081 of the code, CDFW may authorize individuals or public agencies to import, export, take, or possess state-listed endangered, threatened, or candidate species. These otherwise prohibited acts may be authorized through permits or Memoranda of Understanding if the take is incidental to an otherwise lawful activity, impacts of the authorized take are minimized and fully mitigated, the permit is consistent with any

regulations adopted pursuant to any recovery plan for the species, and the project operator ensures adequate funding to implement the measures required by CDFW. The CDFW makes this determination based on available scientific information and considers the ability of the species to survive and reproduce.

California State Fish and Game Code §§ 3503, 3503.5, 3513, and 3800

Section 3503 of the California Fish and Game Code states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptor (i.e., species in the orders *Falconiformes* and *Strigiformes*), including its nests or eggs. Typical violations of these codes include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction. This statute does not provide for the issuance of any type of incidental take permit.

Section 3800 of the California Fish and Game Code affords protection to all nongame birds, which are all birds occurring naturally in California that are not resident game birds, migratory game birds, or fully protected birds.

Section 3513 of the California Fish and Game Code upholds the MBTA by prohibiting any take or possession of birds that are designated by the MBTA as migratory nongame birds except as allowed by federal rules and regulations promulgated pursuant to the MBTA.

California Environmental Quality Act Guidelines § 15380

Although threatened and endangered species are protected by specific federal and state statutes, California Environmental Quality Act (CEQA) Guidelines § 15380(b) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition in FESA and the section of the California Fish and Game Code dealing with rare or endangered plants or animals. This section was included in CEQA primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a candidate species that has not been listed by either USFWS or CDFW. Thus, CEQA provides an agency with the ability to protect a species from the potential impacts of a project until the respective government agencies have an opportunity to designate the species as protected, if warranted. CEQA also calls for the protection of other locally or regionally significant resources, including natural communities. Although natural communities do not at present have legal protection of any kind, CEQA calls for an assessment of whether any such resources would be affected, and requires findings of significance if there would be substantial losses. Natural communities listed by the California Natural Diversity Database (CNDDB) as sensitive are considered by CDFW to be significant resources and fall under the *CEQA Guidelines* for addressing impacts. Local planning documents such as general plans often identify these resources as well.

Native Plant Protection Act – California Fish and Game Code §§ 1900 through 1913

California's Native Plant Protection Act (NPPA) requires all state agencies to use their authority to carry out programs to conserve endangered and rare native plants. Provisions of the NPPA prohibit the taking of listed plants from the wild and require notification of CDFW at least 10 days in advance of any change in land use. This allows CDFW to salvage listed plant species that would otherwise be destroyed. The project operator is required to conduct botanical inventories and consult with CDFW during project planning to comply with the provisions of this act and sections of CEQA that apply to rare or endangered plants.

California Wetland Definition

Unlike the federal government, California has adopted the Cowardin et al. (1979) definition of wetlands. For purposes of this classification, wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes (at least 50 percent of the aerial vegetative cover); (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is non-soil and saturated with water or covered by shallow water at some time during the growing season of each year.

Under normal circumstances, the federal definition of wetlands requires all three wetland identification parameters to be met, whereas the Cowardin definition requires the presence of at least one of these parameters. For this reason, identification of wetlands by state agencies consists of the union of all areas that are periodically inundated or saturated or in which at least seasonal dominance by hydrophytes may be documented or in which hydric soils are present.

California Coastal Act of 1976

The California Coastal Act of 1976 gave the California Coastal Commission (CCC) regulatory authority to protect coastal resources, including shoreline public access and recreation, lower cost visitor accommodations, terrestrial and marine habitat protection, visual resources, landform alteration, agricultural lands, commercial fisheries, industrial uses, water quality, offshore oil and gas development, transportation, development design, power plants, ports, and public works. Development within the coastal zone usually requires a Coastal Development Permit from either the CCC or the local government if such development would occur within the coastal zone.

Clean Water Act, § 401

Under Section 401 of the CWA, the local RWQCB (for this project, the San Diego RWQCB) must certify that actions receiving authorization under Section 404 of the CWA also meet state water quality standards. The RWQCB requires projects to avoid impacts to wetlands if feasible and requires that projects do not result in a net loss of wetland acreage or a net loss of wetland function and values. Compensatory mitigation for impacts to wetlands and/or waters of the state is required.

Porter-Cologne Water Quality Control Act

The RWQCB also has jurisdiction over waters deemed "isolated" or not subject to Section 404 jurisdiction under the *Solid Waste Agency of Northern Cook County v. USACE* decision. Dredging, filling, or excavation of isolated waters constitutes a discharge of waste to waters of the state and prospective dischargers are required to obtain authorization through an Order of Waste Discharge or waiver thereof from the RWQCB and comply with other requirements of Porter-Cologne Act.

3.3 Local

North County Multiple Habitat Conservation Program

The Multiple Habitat Conservation Program (MHCP) is a comprehensive, multiple jurisdictional planning program designed to create, manage, and monitor an ecosystem preserve in northwestern San Diego County. It is one of several large, multiple jurisdictional habitat planning efforts in San Diego County, each of which constitutes a "subregional" plan under the State of California's Natural Community Conservation Planning Act of 1991. The MHCP preserve system is intended to protect viable populations of native plant and animal species and their habitats in perpetuity, while accommodating continued economic development and quality of life for residents of North County. The MHCP subregion encompasses the seven incorporated cities of northwestern San Diego County (Carlsbad, Encinitas, Escondido, Oceanside, San Marcos, Solana Beach, and Vista). These jurisdictions will implement their portions of the MHCP plan through citywide "subarea" plans, which describe the specific policies each city will institute for the MHCP. While not yet formally adopted, the *Final Oceanside Subarea Plan* (City subarea plan) has been implemented since 2010. The project has been evaluated against the provisions of the subarea plan as currently drafted.

The MHCP species are grouped into three general categories for determining conservation: obligate wetland species, narrow endemic species, and other species. Obligate wetland species are species for which all life requisites provided in the MHCP area are expected to be within open water or wetland vegetation communities, which are subject to the no net loss policy. Consequently, inside the focused planning area (FPA), all points for obligate wetland species are calculated as 100% conserved. This assumes 100% conservation of the habitat and active habitat management to ensure no loss of habitat value to support the species. Although wetland habitats outside the FPA are also 100% conserved by the no net loss policy, associated wetland species are calculated as 0% conserved, because active management to ensure habitat value will not be guaranteed outside the FPA. Narrow endemic species are species that are confined to a specific geographic region, soil type, and/or habitat. In hardline FPA areas, location points for narrow endemics are calculated as 100% conserved by impact avoidance. In softline FPA areas, narrow endemic points are calculated as 95% conserved by avoidance, minimization, and species-specific mitigation. Outside of the FPA, narrow endemic points are calculated as 80% conserved based on avoidance, minimization, and species-specific mitigation. Other species include species that are not wetland obligates or narrow endemics. All points falling inside hardline FPA areas are calculated as 100% conserved, based on impact avoidance. In softline FPA areas, points are

generally calculated as conserved at the FPA percent level for the area the point falls within. All points that fall outside of the FPA are calculated as 0% conserved.

Within the project area, the San Luis Rey River corridor includes hardline and softline areas within the FPA. The Buena Vista Lagoon is also considered a hardline area of the FPA (Figure 2). The remainder of the project area, including Loma Alta Creek, is outside of the FPA.

City of Oceanside General Plan

The Environmental Resource Management Element of the City of Oceanside General Plan provides the following goal and objective that applies to vegetation and wildlife habitats.

> **Goal:** Evaluate the state of the environment and formulate a program of planned management, wise utilization, and preservation of our natural resources to ensure the health, safety, and welfare of present and future generations.
>
> > **Objective: Vegetation and Wildlife Habitats.** Conserve and enhance vegetation and wildlife habitats, especially areas of rare, endangered, or threatened species.

4. Methodology

An assessment of biological resources was conducted within the Incentive District and a buffer of 300 feet around the Complete Streets improvements (hereinafter referred to the biological survey area or BSA). A 300-foot buffer was used around the Complete Streets improvements in order to evaluate the potential for sensitive biological resources and to analyze potential indirect noise impacts that could occur during construction of the Complete Streets improvements. Although a specific buffer was not used for the Incentive District review area, the reconnaissance-level survey of this area is larger than what the final Incentive District boundaries would encompass. The BSA represents the greatest extent of biological review conducted for the proposed project (Figure 2).

The assessment was conducted through a review of existing data for the BSA, followed up with a field visit. ESA biologists Julie Stout and Michelle Irace conducted a reconnaissance-level survey for biological resources on August 26, 2016, to assess the potential for sensitive biological resources to occur. The reconnaissance-level survey was conducted by vehicle and on foot, and included vegetation mapping, an assessment of habitat suitability for special-status species, and an assessment of potential jurisdictional resources. Specific methodologies used to assess biological resources are discussed below, including existing data resources that were consulted to supplement the field investigation.

4.1 Vegetation Communities

Vegetation communities within the BSA were characterized based on the *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986) as modified in *Draft Vegetation Communities of San Diego County* (Oberbauer, Kelly, and Buegge 2008). Plant species nomenclature follows that of *The Jepson Manual: Higher Plants of California* (Hickman 1993), as updated in Baldwin (2012). Plant communities were mapped in the field

using printed aerial imagery and later digitized onto orthorectified aerial photographs using Geographic Information System (GIS) technology. A minimum mapping unit of 0.25 acre was used for upland vegetation types and 0.125 acre for riparian/wetland vegetation types. Vegetation communities were then quantified with respect to acreage within the BSA to determine impacts to each community and impacts to habitat for both special-status and common species.

4.2 Jurisdictional Wetlands and Waters

Prior to conducting the field survey, the following resources were reviewed for determining the presence of potential jurisdictional wetlands and waters within the BSA:

- USFWS National Wetlands Inventory (NWI) of wetlands and deep water habitats
- U.S. Geological Survey (USGS) National Hydrography Dataset (NHD)
- CCC coastal zone boundaries

The presence of wetlands and waters potentially under the jurisdiction of USACE, CDFW, and/or RWQCB were assessed during the field survey. Additionally, the project area was reviewed for overlap with areas under the jurisdiction of the CCC. A formal delineation was not conducted and no wetland determination data points were taken as the proposed project is not expected to impact any potential jurisdictional wetlands or waters. Informal jurisdictional wetlands and waters mapping was conducted within 50 feet of the Complete Streets improvements and throughout the Incentive District review area to provide boundaries of any potential jurisdictional wetlands or waters to ensure complete avoidance. The informal jurisdictional delineation, including wetland mapping, conservatively assumed that any areas showing indicators of an OWHM, hydrophytic vegetation, wetland hydrology, and/or riparian vegetation were potentially jurisdictional. Additionally, NWI- and NHD-mapped resources were generally considered potentially jurisdictional except where verified as non-existent during the field investigation.

4.3 Special-Status Species

Prior to conducting the field survey, the following resources were reviewed to aid in determining the potential for special-status species or their habitats to occur:

- CNDDB special-status species occurrence records within one mile of the BSA (Figure 5)
- USFWS-designated critical habitat and federally threatened and endangered species locations
- California Native Plant Society (CNPS) rare plant records
- San Diego Association of Governments (SANDAG) SanBios Database
- North County MHCP (SANDAG 2003)
- City subarea plan (City of Oceanside 2010)

A list of special-status plant and wildlife species was compiled from these resources. During the field survey, the potential for the BSA to support this list of special-status species was evaluated based on an analysis of onsite vegetation and habitats, known home ranges and distribution of target species, and the overall ecological value of the BSA and surrounding area. Focused,

protocol-level surveys for special-status species were not conducted as part of the survey; however, special-status species were recorded, if detected.

4.4 Wildlife Corridors

Prior to the field survey, the City subarea plan (City of Oceanside 2010) was reviewed to confirm the presence of designated habitat linkages and dispersal corridors within the BSA. During the field survey, biologists assessed areas identified in the MHCP within the BSA for potential wildlife corridor functions by noting where narrow corridors containing undeveloped habitat connect larger native habitat areas. Potential wildlife corridors can include streams, riparian areas, and culverts under roadways. Habitat characteristics considered included topography, habitat quality, and adjacent land uses. In addition to reviewing the BSA for presence of continuous corridors, the BSA was also reviewed for potential dispersal corridors for coastal California gnatcatchers based on habitat type and quality, size of habitat patches, and distance separating habitat patches.

5. Results

This section describes the results of the reconnaissance-level survey and desktop literature/database review for each respective biological resource. Site photographs are presented in Appendix B and CNDDB special-status species records are presented in Appendix C.

5.1 Vegetation Communities

Vegetation communities were mapped within the BSA (Figure 3) and are based on the *Draft Vegetation Communities of San Diego County* (Oberbauer et al. 2008). These vegetation communities/land cover types are summarized below and are shown in Table 5-1. The MHCP Habitat Group designation of each vegetation community within the BSA is included in Table 5-1. Vegetation communities are combined into Habitat Groups (A through F) to rank the sensitivity of habitats for purposes of assigning mitigation ratios.

It should be noted that habitat restoration efforts appeared to be taking place along the San Luis Rey River corridor southwest of the bridge crossing at Coast Highway. The flat-topped buckwheat community at this location appeared to be the result of a restoration project. In addition, there was a disturbed habitat area south of the existing bike path that may be actively undergoing restoration as well.

TABLE 5-1
VEGETATION COMMUNITIES AND LAND COVER TYPES IN THE PROJECT AREA (ACRES)

Vegetation Community/Land Cover Type	MHCP Habitat Group[1]	Complete Streets Improvements	Incentive District Review Area (beyond Complete Streets Improvements)
Riparian and Wetlands			
Disturbed Wetland (11200)	A	-	0.05
Emergent Wetland (52440)	A	-	0.11
Coastal Brackish Marsh (52200)	A	-	4.35
Coastal and Valley Freshwater Marsh (52410)	A	-	-
Brackish Water Estuary (64133)	A	-	0.20
Non-Vegetated Floodplain or Channel (64200)	A	-	1.91
Non-Native Riparian (65000)	A	-	1.07
Uplands			
Diegan Coastal Sage Scrub (32500)	C	-	-
Flat-topped Buckwheat (32800)	D	-	0.27
Other Land Cover Types			
Disturbed Habitat (11300)	F	-	16.96
Urban/Developed (12000)	-	37.56	428.86
Total		**37.56**	**453.78**

[1] Habitat Group A consists of wetland/riparian communities that are subject to the MHCP goal of no net loss in acreage, function, and value. Habitat Group B consists of rare upland communities, subject to MHCP goal to avoid impact as much as possible and conserve onsite existing habitat areas. Habitat Group C consists of coastal sage scrub, with an MHCP goal to minimize impacts as much as possible. Habitat Group D consists of chaparral communities (with the exception of southern maritime chaparral), with an MHCP goal to minimize impacts to these communities within FPAs. Habitat Group D consists of annual (nonnative) grasslands, with an MHCP goal to minimize impacts within FPAs as much as possible. Group F consist of other lands such as disturbed or agricultural, which should be considered for avoidance if active uses are discontinued and these lands may support habitat for plants or wildlife species.

SOURCES: Holland 1986; Oberbauer et al. 2008; SANDAG 2003.

Riparian and Wetlands

Disturbed Wetland (11200)

Disturbed wetlands are permanently or periodically inundated by water and have been significantly modified by human activity. Disturbed wetlands include portions of wetlands with obvious artificial structures such as concrete lining, barricades, rip-rap, piers, or gates. Disturbed wetlands are often unvegetated, but may contain scattered native or non-native vegetation. Examples include lined channels, Arizona crossings, detention basins, culverts, and ditches. Characteristic species include *Arundo donax*, *Tamarix* spp., *Eucalyptus* spp., *Phoenix* spp., *Washingtonia* spp., *Cortaderia* spp., and *Cynodon dactylon*, and may also contain *Salix* spp., *Typha* spp., and a variety of other wetland plants. This community occurs in a small patch (0.05 acre) in the Incentive District review area at the southwest corner of Cassidy Street and Broadway Street.

Emergent Wetland (52440)

Emergent wetlands are generally persistent wetlands dominated by low growing, perennial wetland species. These can be found in channels, seeps and springs, floodplains, margins of lakes and rivers, and various basins such as pools and ponds, palustrine lakes, montane meadows, and dune swales. These may be freshwater or alkali wetlands. In San Diego County, these are often in previously disturbed areas where wetlands are emerging, but have not yet established a full suite of species; however, disturbance is not a necessary element of this vegetation community. Characteristic species include *Carex* spp., *Eleocharis* spp., *Juncus* spp., *Rumex* spp., *Sparganium eurycarpum*, and many others. This community occurs along Loma Alta Creek and totals 0.11 acre in the Incentive District review area.

Coastal Brackish Marsh (52200)

Coastal brackish marsh habitat is dominated by perennial, emergent, herbaceous monocots to 2 meters tall. Cover is often complete and dense. Coastal brackish marshes are similar to coastal salt marshes, but brackish from freshwater input. Salinity may vary considerably, and may increase at high tide, during seasons of low freshwater runoff, or both. Coastal brackish marshes usually intergrade with coastal salt marshes toward the ocean and occasionally with freshwater marshes at the mouths of rivers. Characteristic species include *Carex harfordii*, *Carex obnupta*, *Carex* spp., *Distichlis spicata* var. *spicata*, *Juncus* spp., *Salicornia* spp., *Scirpus* spp., and *Typha latifolia*. Coastal brackish marsh is usually found at the interior edges of coastal bays and estuaries or in coastal lagoons. This community occurs at Buena Vista Lagoon and totals 4.35 acres in the Incentive District review area.

Coastal and Valley Freshwater Marsh (52410)

Coastal and valley freshwater marsh is dominated by perennial, emergent monocots measuring 4 to 5 meters tall that often form completely closed canopies. This habitat generally occurs at sites permanently flooded by fresh water (rather than brackish, alkaline, or variable) with prolonged saturation permitting accumulation of deep, peaty soils. Characteristic species include *Carex lanuginosa*, *C. senta*, *Cyperus esculentus*, *C. eragrostis*, *Eleocharis* spp., *Hydrocotyl verticillata triradiata*, *Limosella aquatica*, *Phragmites australis*, *Scirpus acutus*, *S. americanus*, *S. californicus*, *S. robustus*, *Sparganiun eurycarpum*, *Typha angustifolia*, *T. domingensis*, *T. latifolia*, and *Verbena bonariensis*. This habitat is found along the coast and in coastal valleys near river mouths and around the margins of lakes and springs. It is now much reduced in area through its entire range. This community occurs outside of the project area within the BSA at Buena Vista Lagoon.

Brackish Water Estuary (64133)

Water in this estuarine habitat contains more salt than freshwater but less than the open ocean. Salinity fluctuates based on rainfall, evaporation, and tides, although brackish marshes are exposed to limited tidal action. Characteristic species include algae and eel grass (*Zostera marina*). This community occurs at the west end of Loma Alta Creek in 0.20 acre of the Incentive District review area.

Non-Vegetated Floodplain or Channel (64200)

Non-vegetated floodplain or channel occurs along the sandy, gravelly, or rocky fringe of waterways or flood channels and is unvegetated on a relatively permanent basis. Variable water lines inhibit the growth of vegetation, although some weedy species of grasses may grow along the outer edges of the wash. Vegetation may exist here but is usually less than 10% total cover. This community occurs within 1.91 acres of the Incentive District review area, within the BSA but outside of the project area, and below the Complete Streets improvements at the overpasses at San Luis Rey River and Loma Alta Creek.

Non-Native Riparian (65000)

Non-native riparian describes densely vegetated riparian thickets dominated by non-native, invasive species. Non-native, invasive species account for greater than 50% of the total vegetative cover within a mapping unit. Non-native riparian is found in a variety of wetland habitats, often where disturbance has occurred. Characteristic species include *Arundo donax*, *Tamarix* spp., *Eucalyptus* spp., *Phoenix* spp., *Washingtonia* spp., *Cynodon dactylon*, *Ricinus communis*, *Cortaderia* spp. along with natives such as *Pluchea sericea*, *Populus fremontii*, and *Salix* spp. In San Diego County this is common in major river channels such as Otay River, Sweetwater River, San Diego River, San Dieguito River, and San Luis Rey River. This community occurs in 1.07 acres of the Incentive District review area along Loma Alta Creek, and along the San Luis Rey River within the BSA but outside of the project area and below the overpass within the Complete Streets improvements.

Uplands

Diegan Coastal Sage Scrub (32500)

Diegan coastal sage scrub is comprised of low, soft-woody subshrubs and dominated by *Artemisia californica* and *Eriogonum fasciculatum* together with *Malosma laurina*, *Salvia apiana* and *Salvia mellifera*. This community typically occurs on steep, xeric slopes or clay-rich soils that are slow to release stored water. Characteristic species include *Artemisia californica*, *Eriogonum fasciculatum*, *Galvesia speciosa*, *Haplopappus venetus*, *Lavatera assurgentiflora*, *Lotus scoparius*, *Malacothamnus fasciculatus*, *Malosma laurina*, *Rhus integrifolia*, *Salvia apiana*, *Salvia mellifera*, and *Stipa lepida*. This community is more *Malosma*-dominant and occurs within the BSA but outside of the project area near the San Luis Rey River.

Flat-topped Buckwheat (32800)

Flat-topped buckwheat is a near monoculture community usually resulting from disturbance and transitioning to coastal sage scrub or chaparral. Species characteristic of this community appear over time. This community is often found in disturbed areas in the coastal and foothill areas of San Diego County. Characteristic species include *Eriogonum fasciculatum* and *Lotus scoparius*. This community occurs within the BSA but outside of the project area near the San Luis Rey River and within 0.27 acres of the Incentive District review area near Loma Alta Creek along the train track berm.

Other Land Cover Types

Disturbed Habitat (11300)

"Disturbed habitat" describes areas that have been physically disturbed (by previous legal human activity) and are no longer recognizable as a native or naturalized vegetation association, but continue to retain a soil substrate. Typically, vegetation, if present, is nearly exclusively composed of non-native plant species such as ornamentals or ruderal exotic species that take advantage of disturbance, or shows signs of past or present animal usage that removes any capability of providing viable natural habitat for uses other than dispersal. Examples of disturbed land include areas that have been graded, repeatedly cleared for fuel management purposes, and/or experienced repeated use that prevents natural revegetation (i.e., dirt parking lots, trails that have been present for several decades), recently graded firebreaks, graded construction pads, construction staging areas, off-road vehicle trails, and old homesites. Characteristic species include invasive, non-native forb species, such as, thistles ([*Centaurea*], [*Carduus*], and [*Cynara*] spp.), *Sonchus* spp., *Salsola tragus*, *Heterotheca grandiflora*, *Marrubium vulgare*, *Sisymbrium irio*, *Raphanus* spp., *Carpobrotus edulis*, *Chrysanthemum* spp., and *Foeniculum vulgare*. The limited number of grass species includes pampas grass (*Cortaderia* spp.) and fountain grass (*Pennisetum* spp.). It should be noted that the disturbed habitat within the BSA provides no natural habitat and does not meet preserve design goals such as providing important links or corridors for wildlife movement, which would preclude it from conservation of Group F lands, as discussed in the MHCP (SANDAG 2003). This habitat occurs within 0.92 acres of the Complete Streets improvements area and 16.96 acres of the Incentive District review area.

Urban/Developed (12000)

"Urban/developed land cover type" describes areas that have been constructed upon or otherwise physically altered to an extent that native vegetation is no longer supported. Developed land is characterized by permanent or semi-permanent structures, pavement or hardscape, and/or landscaped areas that often require irrigation. Urban/developed land cover type also includes areas where no natural land is evident due to a large amount of debris or other materials being placed upon it (e.g., car recycling plant, quarry), as well as unvegetated or landscaped areas with a variety of ornamental (usually non-native) plants. This land cover type occurs within the entire Complete Streets improvements (37.56 acres) and within the majority of the Incentive District review area (428.78 acres).

5.2 Jurisdictional Wetlands and Waters

No jurisdictional wetlands or waters were mapped within the Complete Streets improvements project area; however, jurisdictional wetlands and waters were mapped within the 50-foot buffer area of the Complete Streets improvements and within the Incentive District review area (Figure 4). Jurisdictional resources include the riparian/riverine concrete-lined channels and natural earthen features along the San Luis Rey River, Loma Alta Creek and Slough, and the Buena Vista Lagoon, as shown in Figure 4. These three areas represent NHD blue-line streams and all are considered impaired waterbodies by the Environmental Protection Agency (EPA). The project area is also within the coastal zone, an area regulated by the CCC.

The USACE-jurisdictional areas include wetland and non-wetland waters associated with the San Luis Rey River, Loma Alta Creek and Slough, and the Buena Vista Lagoon. These waters are direct tributaries to the Pacific Ocean, a Traditional Navigable Water.[2]

The San Diego RWQCB has jurisdiction over all USACE jurisdictional waters that were mapped, as well as isolated surface and subsurface waters beyond USACE jurisdiction. The project area is within three Hydrologic Unit Code (HUC) 12 subwatersheds. The northern segment is within the Guajome Lake-San Luis Rey River subwatershed (HUC 180703030304), the middle segment is within the Loma Alta Creek-Frontal Gulf of Santa Catalina subwatershed (HUC 180703030504), and the southern segment is within the Buena Vista Creek subwatershed (HUC 180703030501; EPA 2015).

The CDFW jurisdictional limits generally coincided with areas under USACE jurisdiction because USACE jurisdiction was mapped conservatively to include all riparian habitat associated with streams and estuaries.

5.3 Special-Status Species

Special-status species identified during the desktop literature and database review within one mile of the BSA are included in Appendix A and shown in Figure 5. No special-status species were detected during the field survey and no USFWS-designated critical habitat is present within the BSA. No special-status species are expected to occur in the Complete Streets improvements due to its developed nature. Potential for special-status species to occur is discussed below for the remaining portions of the BSA that include the Incentive District review area and the 300-foot buffer around the Complete Streets improvements.

Special-Status Plants

Special-status plants identified during the desktop literature/database review are summarized in Table 5-2 with potential to occur. The BSA includes a critical population of Nuttall's lotus (*Acmispon prostrates*) outside of the project area within the riparian corridor along the south side of the San Luis Rey River. Additionally, populations of sticky dudleya (*Dudleya viscida*) occur along the San Luis Rey River corridor both northeast and southwest of the project area (City of Oceanside 2008). These occurrences are within the BSA but outside of the project area. No special-status plant species are expected to occur in the proposed Complete Streets improvements due to its developed nature; however, a total of eleven species have a high or moderate potential to occur within the BSA, excluding the Complete Streets improvements: Nutall's lotus, Coulter's saltbush (*Atriplex coulteri*), smooth tarplant (*Centromadia pungens ssp. laevis*), Orcutt's pincushion (*Chaenactis glabriuscula var. orcuttiana*), Blochman's dudleya (*Dudleya blochmaniae ssp. blochmaniae*), sticky dudleya, cliff spurge (*Euphorbia misera*), San Diego barrel cactus (*Ferocactus viridescens*), decumbent goldenbush (*Isocoma menziesii var. decumbens*), sea dahlia (*Leptosyne maritima*), and spreading navarretia (*Navarretia fossalis*).

[2] As defined under 33 CFR 329, Traditional Navigable Waters are waters subject to the ebb and flow of the tide, and those inland waters that are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

TABLE 5-2
SPECIAL-STATUS PLANT SPECIES' POTENTIAL TO OCCUR IN THE BIOLOGICAL STUDY AREA[1]

Scientific Name	Common Name	Protective Status[2]	Specific habitat[3]	Potential to Occur[3]
Acmispon prostratus	Nuttall's lotus	1B.1 MHCP: Narrow Endemic	Coastal dunes, coastal scrub (sandy).	High potential – Previously recorded populations within the BSA along the San Luis Rey River corridor.
Atriplex coulteri	Coulter's saltbush	1B.2	Coastal bluff scrub, coastal dunes, coastal scrub, valley and foothill grassland, alkaline or clay soils.	High potential – May occur in the sandy disturbed habitats.
Centromadia pungens ssp. laevis	Smooth tarplant	1B.1	Chenopod scrub, meadows and seeps, playas, riparian woodland, valley and foothill grassland, alkaline soils.	Medium potential – May occur in alkaline soils within disturbed habitats.
Chaenactis glabriuscula var. orcuttiana	Orcutt's pincushion	1B.1	Coastal bluff scrub (sandy), coastal dunes.	Medium potential – May occur in the sandy disturbed habitats.
Dudleya blochmaniae ssp. blochmaniae	Blochman's dudleya	1B.1 MHCP: Covered	Coastal bluff scrub, chaparral, coastal scrub, valley and foothill grassland, often clay or serpentinite soils.	High potential – May occur in the sandy disturbed habitats and coastal scrub.
Dudleya viscida	Sticky dudleya	1B.2 MHCP: Covered	Coastal bluff scrub, chaparral, cismontane woodland, coastal scrub, rocky soils.	High potential – May occur in the coastal scrub along the San Luis Rey River.
Eryngium aristulatum var. parishii	San Diego button-celery	E 1B.1 MHCP: Narrow Endemic, Wetland Obligate	Vernal pools.	Not expected - Suitable habitat not present.
Euphorbia misera	Cliff spurge	2B.2 MHCP: Covered	Coastal bluff scrub, coastal scrub, Mojavean desert scrub, rocky soils.	High potential – Previously recorded along light rail line.
Ferocactus viridescens	San Diego barrel cactus	2B.1 MHCP: Covered	Chaparral, coastal scrub, valley and foothill grassland.	Medium potential - May occur in coastal scrub habitat.
Isocoma menziesii var. decumbens	Decumbent goldenbush	1B.2	Chaparral, coastal scrub, sandy soils, often in disturbed areas.	High potential – May occur within disturbed habitat, coastal sage scrub, and flat-topped buckwheat communities.
Leptosyne maritima	Sea dahlia	2B.2	Coastal bluff scrub, coastal scrub.	High potential - May occur in coastal scrub habitat. Previous record in Lawrence Canyon.
Navarretia fossalis	Spreading navarretia	1B.1 MHCP: Narrow Endemic, Wetland Obligate	Chenopod scrub, marshes and swamps (assorted shallow freshwater), playas, vernal pools.	Medium potential –Suitable habitat along marsh fringes.
Nemacaulis denudata var. denudata	Coast woolly-heads	1B.2	Coastal dunes.	Low potential - May occur in the sandy disturbed habitats.

TABLE 5-2
SPECIAL-STATUS PLANT SPECIES' POTENTIAL TO OCCUR IN THE BIOLOGICAL STUDY AREA[1]

Scientific Name	Common Name	Protective Status[2]	Specific habitat[3]	Potential to Occur[3]
Nemacaulis denudata var. gracilis	Slender cottonheads	2B.2	Coastal dunes, desert dunes, Sonoran desert scrub.	Low potential - May occur in the sandy disturbed habitats.

[1] Biological Study Area, excluding the Complete Streets improvements where no special-status plant species are expected to occur.

[2] **Protective Status:**
USFWS: E=endangered under the FESA; T = threatened under the FESA
CDFW: E=endangered under the CESA; T = threatened under the CESA; WL = Watch List; SSC = Species of Special Concern
MHCP – Multiple Habitat Conservation Plan (SANDAG, 2003). For status descriptions, see section 3.3.

California Rare Plant Rank (CRPR):
1a: plants presumed extirpated in California and either rare or extinct elsewhere
1b: plants rare, threatened, or endangered in California and elsewhere
2a: plants presumed extirpated in California, but common elsewhere
2b: plants rare, threatened, or endangered in California, but more common elsewhere
3: plants about which more information is needed - a review list
4: plants of limited distribution - a watch list

Threat Ranks
0.1 seriously threatened in California (over 80% of occurrences threatened / high degree and immediacy of threat)
0.2 moderately threatened in California (20-80% occurrences threatened / moderate degree and immediacy of threat)
0.3 not very threatened in California (less than 20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

[3] **Potential to Occur (Source: California Native Plant Society Rare Plant Program, CNPS 2016)**
Not expected: the study area completely lacks suitable habitat or there is suitable habitat but the study area lies well outside the species' geographic and/or elevational range or the species has not been documented in the general area for more than 50 years.
Low potential: the study area and/or immediate vicinity contains marginal (low quality) habitat for a particular species and is within the species' known range or there is suitable habitat in the study area but the species has not been reported in the general area for more than 25 years.
Medium potential: the study area contains suitable habitat for a particular species and lies within the species' known range or the study area contains marginally suitable habitat and the species is known to occur in the general area.
High potential: the study area and/or immediate vicinity provides suitable habitat for a particular species and the species has been documented in the general vicinity within the last 25 years.
Present: the species or vegetation community/habitat was observed within the study area and/or immediate vicinity during surveys.

SOURCES: CNDDB 2011; CNPS 2016; SanBIOS 2016;

Special-Status Wildlife

Special-status wildlife species identified during the desktop literature/database review, as well as additional species identified with the potential to occur within the BSA, are summarized in Table 5-3. No special-status wildlife species were observed during the reconnaissance-level survey. Due to its urban/developed nature, none are expected to occur within the Complete Streets improvements. A total of 10 species have a moderate to high potential to occur within the portions of the BSA that include the Incentive District review area and the buffer of the Complete Streets improvements: two-striped garter snake (*Thamnophis hammondii*), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), white-faced ibis (*Plegadis chihi*), coastal California gnatcatcher (*Polioptila californica californica*), light-footed Ridgway's rail (*Rallus longirostris levipes*), California least tern (*Sternula antillarum browni*), least Bell's vireo (*Vireo bellii pusillus*), western yellow bat (*Lasiurus xanthinus*), San Diego black-tailed jackrabbit (*Lepus californicus bennettii*), and pocketed free-tailed bat (*Nyctinomops femorosaccus*).

TABLE 5-3
SPECIAL-STATUS WILDLIFE SPECIES' POTENTIAL TO OCCUR IN THE BIOLOGICAL STUDY AREA

Scientific Name	Common Name	Protective Status[1]	Preferred Habitat	Potential to Occur[2]
Fish				
Eucyclogobius newberryi	Tidewater goby	E, SSC	Coastal lagoons, estuaries, and marshes.	Not expected – CNDDB record presumed extirpated.
Reptiles				
Crotalus ruber	Red-diamond rattlesnake	SSC	Chaparral, cactus patches, boulders.	Low potential – Marginal habitat along the San Luis Rey River.
Thamnophis hammondii	Two-striped garter snake	SSC	Generally found around pools, creeks, cattle tanks, and other water sources, often in rocky areas, in oak woodland, chaparral, brushland, and coniferous forest.	High potential – Potential to occur along scrub habitat near the San Luis Rey River.
Birds				
Aimophila ruficeps canescens	Southern California rufous-crowned sparrow	WL MHCP: Covered	Rocky hillsides and steep slopes in open grass and coastal sage scrub.	Medium potential – Small patches of habitat along the San Luis Rey River. Known to occur outside of the BSA in Lawrence Canyon.
Athene cunicularia	Burrowing owl	SSC MHCP: Covered	Open habitats for foraging with existing burrows for shelter and nesting.	Low potential – Potential to occur in disturbed and scrub habitats during migration, wintering, and dispersal. Habitat patches are too small to support nesting or a persistent population.
Charadrius alexandrinus nivosus	Western snowy plover	T, SSC MHCP: Obligate Wetland Species	Barren to sparsely vegetated sand or soils along beaches, lagoons, river bars.	Low potential – Suitable habitat not present; however foraging habitat may become available if mudflats become exposed within lagoon areas during low water.
Passerculus sandwichensis beldingi	Belding's savannah sparrow	SE MHCP: Obligate Wetland Species	Coastal salt marsh.	Low potential – Prefers pickleweed (*Salicornia* sp.) dominated salt marsh. Brackish marsh habitat in the BSA is dominated by cattails (*Typha* sp).
Plegadis chihi	White-faced ibis	WL MHCP: Obligate Wetland Species	Marshes. Breeds colonially in bushes or low trees.	Medium potential – Brackish marsh habitat present.
Polioptila californica californica	Coastal California gnatcatcher	T, SSC MHCP: Covered	Coastal sage scrub.	High potential – Potential for breeding along the San Luis Rey River. Flat-topped buckwheat patches may be used during dispersal.
Rallus obsoletus levipes	Light-footed Ridgway's rail	E, SE, FP MHCP: Covered	Coastal salt marsh.	High potential – Known to occur in Buena Vista Lagoon.

Scientific Name	Common Name	Protective Status[1]	Preferred Habitat	Potential to Occur[2]
Riparia riparia	Bank swallow	ST	Nests in streamside banks.	Not expected – Extirpated from San Diego County
Sternula antillarum browni	California least tern	E, SE, FP MHCP: Covered	Seacoasts, beaches, bays, estuaries, lagoons, lakes and rivers, breeding on sandy or gravelly beaches and banks of rivers or lakes.	High potential – Foraging habitat only in estuary and open water habitats.
Vireo bellii pusillus	Least Bell's vireo	E, SE MHCP: Obligate Wetlands Species	Riparian scrub and forest.	High potential – Previously recorded along the San Luis Rey River.
Mammals				
Lasiurus xanthinus	Western yellow bat	SSC	Frequently roosts in trees and palm skirts.	High potential – Potential roosting habitat in palms and dense vegetation in non-native riparian and urban/developed habitats.
Leptonycteris yerbabuenae	Lesser long-nosed bat	E	Inland deserts, foraging on cactus flowers and roosting in caves and mines.	Not expected – CNDDB record is likely a vagrant during migration.
Lepus californicus bennettii	San Diego black-tailed jackrabbit	SSC MHCP: Covered	Coastal sage scrub, alkali meadow, and disturbed areas.	Medium potential – Potential to occur along the San Luis Ray River corridor.
Nyctinomops femorosaccus	Pocketed free-tailed bat	SSC	Prefers cliffs for roosting and inland habitats for foraging.	Medium potential – Marginal habitat present with potential for foraging in various habitats and roosting under bridges or in buildings.
Perognathus longimembris pacificus	Pacific pocket mouse	E, SSC MHCP: Narrow Endemic	Sandy coastal soils of coastal strand, coastal dunes, and coastal sage scrub habitats.	Not expected – Presumed extirpated; historic occurrence near Mission Avenue. Current distribution at Marine Corps Base Camp Pendleton.

[1] **Protective Status:**
USFWS: E=Endangered under the FESA; T = Threatened under the FESA
CDFW: E=Endangered under the CESA; T = Threatened under the CESA; WL = Watch List; SSC = Species of Special Concern
MHCP –Multiple Habitat Conservation Program (SANDAG, 2003). For status descriptions, see section 3.3.

[2] **Potential to Occur:**
Not Expected: The study area completely lacks suitable habitat OR there is suitable habitat but the study area lies well outside the species' geographic and/or or elevational range or the species has not been documented in the general area for more than 50 years.
Low Potential: The study area and/or immediate vicinity contains marginal (low quality) habitat for a particular species and is within the species' known range or there is suitable habitat in the study area but the species has not been reported in the general area for more than 25 years.
Medium Potential: The study area contains suitable habitat for a particular species and lies within the species' known range or the study area contains marginally suitable habitat and the species is known to occur in the general area.
High Potential: The study area and/or immediate vicinity provides suitable habitat for a particular species and the species has been documented in the general vicinity within the last 25 years.
Present: The species or vegetation community/habitat was observed within the study area and/or immediate vicinity during surveys.

SOURCES: CNDDB 2011; SanBIOS 2016; USFWS 2016.

5.4 Wildlife Movement and Habitat Linkages

The highly developed and urbanized nature of the project area limits its potential to support wildlife movement or habitat linkages. Outside of the project area, but within the BSA, there are limited areas with native habitat that can function as wildlife corridors. In particular, east-west linkages, primarily along narrow riparian corridors, are important to maintaining ecological balance in these lagoon and marsh ecosystems by allowing access by larger predators, especially coyotes (SANDAG 2003). Small islands of native habitat can also be important as resting areas for migrating or dispersing birds traveling over developed areas to larger patches of native habitat.

Within the BSA, the MHCP identifies corridors along the San Luis Rey River (at the northern end of the project area), Loma Alta Creek and Slough (in the middle of the project area), and Buena Vista Lagoon (on the southern end of the project area) as linear swaths of native habitat available to wildlife for movement and dispersal. The MHCP identifies the potential for wildlife corridor use via ranking of composite habitat values. The San Luis Rey River corridor has a ranking of very high while the north side of Buena Vista Lagoon is ranked as low. Terrestrial mammals and birds cross under Coast Highway at these locations to access the habitat east and west of the project area. These areas are also noted as FPAs within the City subarea plan, primarily as Hardline Areas requiring 90% to 100% conservation (Figure 2). Outside of these riparian corridors, the remainder of the BSA is precluded from use for wildlife movement due to the developed nature of the majority of this area.

The City subarea plan does not identify wildlife corridor planning zones or gnatcatcher corridor constrained areas within the BSA (City of Oceanside 2010). However, a regional gnatcatcher corridor is identified directly adjacent and to the northeast of the BSA on the opposite side of Interstate 5 (Figure 2). A small sliver of this corridor overlaps the BSA over the Interstate 5 freeway; however, this portion of the corridor would be non-functional for gnatcatcher use and was likely included because the corridor was mapped at a broad scale.

6. Impacts and Avoidance, Minimization, and Mitigation Measures

This section presents the potential impacts to biological resources that would occur with implementation of the proposed project, the regulatory framework and permitting requirements as applicable to the specific biological resources identified within the BSA, and recommended avoidance, minimization, and mitigation measures to address the potential impacts to biological resources. Impacts and mitigation measures are presented separately for the Complete Streets improvements and the Incentive District review area.

6.1 Complete Streets Improvements

The Complete Streets improvements would include road repainting (or restriping) and roundabout construction and installation at various intersections. Other improvements may include removal of trees and ornamental vegetation, crosswalk additions, and bulbout installation. These later elements would be primarily within areas mapped as urban/developed.

Special-Status Species

Migratory birds (including raptors) and several special-status wildlife species have the potential to occur within the Complete Streets improvements area and/or buffer, and could be impacted by the project as a result of tree removal and/or construction noise during the breeding season. Migratory birds may nest in trees located along the area planned for the Complete Streets improvements. If trees with nesting birds were to be removed direct mortality to individuals or eggs could occur, which would be considered a significant impact. Based on the primarily urban/developed nature of the area surrounding the project area, migratory birds potentially nesting along Coast Highway currently have some degree of tolerance for human presence and noise. While these migratory birds might have a degree of tolerance for human presence and noise, migratory birds could nest in trees adjacent to intersections where roundabouts and other physical improvements are proposed to be constructed, which could result in a significant impact to breeding activities due to construction-related noise. To address this impact implementation of MM Complete Streets BIO-1 would provide for a preconstruction nesting bird survey and other protection measures by a qualified biologist within 300 feet of construction activities, if construction activities need to take place during the breeding season.

Special-status wildlife species that have the potential to occur within the Complete Streets improvements area and/or buffer include two-striped garter snake, California least tern, light-footed Ridgway's rail, white-faced ibis, burrowing owl, southern California rufous-crowned sparrow, coastal California gnatcatcher, least Bell's vireo, western yellow bat, pocketed free-tailed bat, and San Diego black-tailed jackrabbit. No direct impacts to two-striped garter snake, California least tern, light-footed Ridgway's rail, white-faced ibis, burrowing owl, southern California rufous-crowned sparrow, coastal California gnatcatcher, least Bell's vireo, western yellow bat, pocketed free-tailed bat, or San Diego black-tailed jackrabbit would occur because the physical construction activities associated with the Complete Streets improvements (restriping, roundabouts, bulbouts, streetscape enhancements, and street lighting) would only impact urban/developed areas where these species are not expected to occur.

No indirect impacts related to noise or other factors are expected to occur because only restriping activities would occur within 100 feet or less of potential habitats for these species, with the exception of physical construction activities south of Vista Way which may include physical construction activities such as curb extensions, minor landscaping, new wheelchair access ramps, and a median island refuge. These activities may generate noise above baseline levels at a distance of less than 300 feet from potential habitat for light-footed Ridgeway's rails, resulting in a potentially significant impact to this special-status species. With implementation of MM Complete Streets BIO-2, impacts to light-footed Ridgeway's rails would be reduced to a less than significant level.

Western yellow bats may occur within skirted palm trees within the Complete Streets improvements area. Removal of skirted palm trees, if required for roundabout installation, may result in direct western yellow bat mortality or disturbance of maternity roosts, and would be considered a significant impact. However, MM Complete Streets BIO-2 would require a preconstruction survey of skirted palm trees by a qualified biologist prior to implementing western yellow bat protection measures to avoid significant impacts. With implementation of

MM Complete Streets BIO-3, impacts to western yellow bats would be reduced to a less than significant level.

No direct impacts to rare plants are expected because the physical construction activities associated with the Complete Streets improvements (restriping, roundabouts, bulbouts, streetscape enhancements, and street lighting) would only impact urban/developed areas where rare plants are not expected to occur. No indirect impacts to rare plants are expected because the Complete Streets improvements adjacent to potential habitat for rare plants (San Luis Rey River Crossing and Buena Vista Lagoon) would only involve restriping which would not generate sedimentation, dust, or runoff into adjacent areas.

MM Complete Streets BIO-1: Nesting Migratory Birds - Tree removal shall take place outside of the migratory bird breeding season (February 15 through August 31). If avoidance is not feasible and tree removal is required during the avian breeding season, the following measures shall be followed**:**

a. A nesting bird survey of trees planned for removal and within 300 feet of construction activities shall be conducted by a qualified avian biologist no more than one week prior to commencement of tree removal activities. A qualified avian biologist refers to a person with the ability to identify birds present in San Diego County to the species level by sight or sound and who is familiar with the breeding and nesting behaviors of native bird species.

b. If active nests with eggs or chicks of bird species protected under the MBTA are detected within trees or shrubs planned for removal, the trees will remain in place until it has been determined by the avian biologist that the nest is no longer active. If active nests are detected within 300 feet of physical construction activities, an appropriate buffer shall be determined by the avian biologist and no work shall take place within the buffer until it is determined that the nest is no longer active. Additional visits after the initial survey shall be conducted as necessary to determine that nests are no longer active.

MM Complete Streets BIO-2: Light-footed Ridgeway's Rails - For physical construction activities occurring less than 300 feet from potential light-footed Ridgeway's rail habitat associated with Buena Vista Lagoon (activities south of 33.169759°, -117.357623°, including the activities planned near the Buena Vista Audubon Society building), focused protocol surveys shall be conducted by a permitted biologist. If no rails are detected, construction may commence. If rails are detected, consultation with the USFWS would be required and may include non-disturbance areas within 300 feet of territories, implementation of noise attenuation measures, and/or daily biological monitoring and daily noise monitoring during the course of construction activities to confirm that construction activities are not adversely impacting nesting or foraging activities.

MM Complete Streets BIO-3: Special-Status Bats – This mitigation measure shall be required if removal of palm trees is proposed as part of the Complete Streets project. To avoid impacts to western yellow bats, a qualified biologist (a biologist with the ability to identify bat guano and assess habitat suitability for western yellow bats) shall inspect the base of palm skirts for guano

prior to removal of skirted palm trees (i.e. palm trees with several layers of accumulated dead fronds). If bats are detected, tree removal shall avoid the yellow bat maternity season (June 1 through August 31). If tree removal cannot avoid the maternity season, bat protection protocols shall be identified and implemented by a qualified bat biologist and approved by CDFW. The protocols may require installation of bat exclusionary devices, followed by up to four weeks of nightly monitoring by a qualified biologist to confirm bats are being excluded without harm until it is determined bats are no longer present. The protocols may also require construction of substitute bat habitat (i.e., bat boxes, artificial tree structures) in the vicinity of bat-occupied palm trees, followed by monitoring by a qualified biologist to confirm bats are using the bat habitat.

Vegetation Communities

No direct impacts to vegetation communities would occur with implementation of the proposed Complete Streets improvements. All work would occur within the urban/developed land cover type, which is not considered an MHCP habitat group and is not a sensitive vegetation community.

There are areas where Habitat Group A plant communities, which are considered as having the highest conservation priority, occur immediately adjacent to the Complete Streets improvements. These areas are coincident with FPAs associated with the San Luis Rey River crossing (bridge location in the northern end of the project area), Buena Vista Lagoon (at the south end of the project area, south of Eaton Street), and the Loma Alta Creek crossing (in the middle of the project area). Plant communities in these areas are riparian/wetland communities such as non-vegetated channel, non-vegetated floodplain, and non-native riparian.

Indirect impacts to riparian habitats and sensitive natural communities could result from work adjacent to the San Luis Rey River, Loma Alta Creek, and Buena Vista Lagoon by contributing to the spread of invasive species or generation of construction-related runoff, sedimentation, or dust. However, work adjacent to the San Luis Rey River would be limited to road restriping and would not require asphalt grinding or other activities that would result in creation of debris, sedimentation, or run-off. Therefore, no indirect impacts would occur to riparian habitat and other sensitive natural communities near the San Luis Rey River.

Physical construction activities that could indirectly impact riparian habitats and sensitive natural communities at Loma Alta Creek and Buena Vista Marsh include mid-block crosswalks proposed across Coast Highway adjacent to the Loma Alta Creek footpath (south of the existing Loma Alta Creek bridge) and near the Buena Vista Audubon Society driveway south of Eaton Street near Buena Vista Lagoon. Implementation of MM Complete Streets BIO-4 would avoid potential indirect impacts to Habitat Group A vegetation communities that have the potential to occur in this area.

MM Complete Streets BIO-4: Indirect Impacts to Sensitive Vegetation Communities – To avoid indirect impacts to riparian habitats and sensitive natural communities adjacent to the San Luis Rey River, Loma Alta Creek, and Buena Vista Lagoon, the following measures shall be implemented:

a. Species with a rating of moderate or high on the California Invasive Plant Council Inventory Database shall not be used for streetscaping in the Complete Streets project components. This measure shall be considered in the development and design of planting plans for the project. This is particularly important in areas adjacent to undeveloped habitat, including all areas south of Eaton Street. However, it is recommended that these plants not be used in a whole of the project.

b. In areas where there is potential for erosion or construction-generated runoff, sedimentation, or dust from construction activities to impact adjacent Habitat Group A through E communities, best management practices (BMPs), such as silt fencing and/or straw waddles, shall be installed on the downslope portion of grading or disturbance areas during project construction activities. This measure applies to Complete Streets improvements south of Eaton Street and adjacent to Loma Alta Creek.

Jurisdictional Wetlands and Waters

No federal or state wetlands or other waters occur within the Complete Streets improvements area; therefore, no direct impacts to jurisdictional wetlands or waters would occur. Jurisdictional wetlands and waters are present within the 50-foot buffer of the Complete Streets improvements at the San Luis Rey River crossing (in the northern end of the project area), the Loma Alta Creek crossing (in the middle of the project area), and Buena Vista Lagoon (at the south end of the project area).

Indirect impacts to federal or state wetlands or other waters could result from work adjacent to the San Luis Rey River, Loma Alta Creek, and Buena Vista Lagoon by contributing to the spread of invasive species or generation of construction-related runoff, sedimentation, or dust. However, work adjacent to the San Luis Rey River would be limited to road restriping and would not require asphalt grinding or other activities that would result in creation of debris, sedimentation, or run-off. Therefore, no indirect impacts would occur to federal or state wetlands or other waters near the San Luis Rey River.

Physical construction activities that could indirectly impact federal or state wetlands or other waters include mid-block crosswalks proposed across Coast Highway adjacent to the Loma Alta Creek footpath (south of the existing Loma Alta Creek bridge) and near the Buena Vista Audubon Society driveway south of Eaton Street near Buena Vista Lagoon. However, implementation of MM Complete Streets BIO-4 would address impacts to federal or state wetlands or other waters.

Wildlife Movement and Habitat Linkages

The Complete Streets improvements would occur entirely within urban/developed areas; therefore, no native habitats with potential to function as wildlife movement corridors or habitat linkage areas would be impacted. Additionally, noise generating activities associated with construction would occur greater than 300 feet away from native habitats that may be used for wildlife movement.

6.2 Incentive District

The Incentive District would provide optional regulations and standards which a developer or property owner may choose in lieu of the existing underlying zoning. Because future development projects that may fall under the Incentive District are not known at this time, this project component is analyzed programmatically.

Special-Status Species

Migratory birds (including raptors) have the potential to occur within the Incentive District area and could be impacted by future development during the breeding season. Removal of trees with nesting birds could result in direct mortality to individuals or eggs, which would be considered a significant impact. Construction noise could also result in a significant impact to breeding activities. MM Incentive District BIO-1 would provide for a preconstruction nesting bird survey and other protection measures by a qualified biologist within 300 feet of construction activities, if construction activities need to take place during the breeding season. With implementation of MM Incentive District BIO-1, impacts to nesting migratory birds would be reduced to a less than significant level.

Special-status wildlife species that have the potential to occur within the Incentive District include burrowing owl, white-faced ibis, California least tern, Ridgway's rail, western yellow bat, and pocketed free-tailed bat. White-faced ibis and California least tern have a low potential to forage in the western portion of Loma Alta Creek; however, indirect impacts to foraging activity resulting from development within the overlay are expected to be less than significant because the creek provides low quality habitat and is not located in close proximity to breeding colonies for these species. Western burrowing owls have a low potential to occur within the disturbed areas south of Vista Avenue and north of Loma Alta Creek. These areas only provide small isolated pockets of habitat and there are no known breeding populations or recent records in the vicinity, thus burrowing owls are not expected to breed or reside at these locations and may only occur as stopover or transient visitors. Therefore, no significant impacts to this species are expected.

Indirect impacts to light-footed Ridgway's rail related to noise during construction activities would occur within 300 feet or less of potential habitats for these species located at Buena Vista Lagoon. Noise above baseline levels during the breeding season at a distance of less than 300 feet would be considered a potentially significant impact to this special-status species. With implementation of MM Incentive District BIO-2, impacts to light-footed Ridgeway's rails would be reduced to a less than significant level.

Pocketed free-tailed bats and western yellow bats have a low potential to forage or roost within the Incentive District, but direct and indirect impacts to these species would be less than significant because the developed habitat with ornamental landscaping that is available within the Incentive District is ubiquitous in the region. Western yellow bats also have the potential to have maternity roosts within palm trees within the Incentive District and could be directly impacted by palm tree removal. With implementation of MM Incentive District BIO-3, impacts to western yellow bats would be reduced to a less than significant level.

Future projects implemented under the Incentive District have the potential to directly impact special-status plants where potential habitat for these species occurs within the Incentive District within the disturbed areas along the rail line, north of Loma Alta Creek, and south of Vista Way. Indirect impacts could also result from activities adjacent to habitat due to the introduction or spread of invasive species that compete with special-status plants or the generation of construction-related runoff, sedimentation, or dust that could degrade potential habitat. Implementation of MM Incentive District BIO-4 would provide for appropriate project-specific protection measures such that impacts to special-status plants would be avoided or reduced to a less than significant level.

MM Incentive District BIO-1: Nesting Migratory Birds - If tree removal is required for a project proposed under the Incentive District, tree removal and construction activities shall take place outside of the migratory bird breeding season (February 15 through August 31). If avoidance is not feasible and tree removal is required during the avian breeding season, the following measures shall be followed:

a. A nesting bird survey of trees planned for removal and within 300 feet of construction activities shall be conducted by a qualified avian biologist no more than one week prior to commencement of tree removal activities. A qualified avian biologist refers to a person with the ability to identify birds present in San Diego County to the species level by sight or sound and who is familiar with the breeding and nesting behaviors of native bird species.

b. If active nests with eggs or chicks of bird species protected under the MBTA are detected within trees or shrubs planned for removal, the trees will remain in place until it has been determined by the avian biologist that the nest is no longer active. If active nests are detected within 300 feet of physical construction activities, an appropriate buffer shall be determined by the avian biologist and no work shall take place within the buffer until it is determined that the nest is no longer active. Additional visits after the initial survey shall be conducted as necessary to determine that nests are no longer active.

MM Incentive District BIO-2: Light-footed Ridgeway's Rails - For development activities occurring less than 300 feet from potential light-footed Ridgeway's rail habitat associated with Buena Vista Lagoon (development southwest of the intersection of Eaton Street and South Coast Highway), focused protocol surveys shall be conducted by a permitted biologist. If no rails are detected, construction may commence. If rails are detected, consultation with the USFWS would be required and may include non-disturbance areas within 300 feet of territories, implementation of noise attenuation measures, and/or daily biological monitoring and daily noise monitoring during the course of construction activities to confirm that construction activities are not adversely impacting nesting or foraging activities.

MM Incentive District BIO-3: Special-Status Bats – This mitigation measure shall be required if removal of palm trees (which may contain western yellow bats) is proposed as part of a project proposed under the Incentive District. To avoid impacts to western yellow bats, a qualified biologist (a biologist with the ability to identify bat guano and assess habitat suitability for western yellow bats.) shall inspect the base of palm skirts for guano prior to removal of skirted

palm trees (i.e. palm trees with several layers of accumulated dead fronds). If bats are detected, tree removal shall avoid the yellow bat maternity season (June 1 through August 31). If tree removal cannot avoid the maternity season, project-specific bat mitigation protocols shall be identified and implemented by a qualified bat biologist and approved by CDFW. The protocols may require installation of bat exclusionary devices, followed by up to four weeks of nightly monitoring by a qualified biologist to confirm bats are being excluded without harm until it is determined bats are no longer present. The protocols may also require construction of substitute bat habitat (i.e., bat boxes, artificial tree structures) in the vicinity of bat-occupied palm trees, followed by monitoring by a qualified biologist to confirm bats are using the bat habitat.

MM Incentive District BIO-4: Rare Plants - To avoid impacts to narrow endemic rare plants, including Nutall's lotus, Coulter's saltbush, smooth tarplant, Orcutt's pincushion, Blochman's dudleya, cliff spurge, San Diego barrel cactus, decumbent goldenbush, sea dahlia, and spreading navarretia that may occur within the Incentive District, a qualified rare plant biologist shall conduct a preconstruction rare plant survey in areas with potential habitat for rare plants, including in areas that are considered disturbed. Qualified rare plant biologist refers to a person with knowledge of these species (appropriate plant survey windows and species identification). The qualified rare plant biological shall work with the City to identify project-specific measures that are consistent with the specifications of the Multiple Habitat Conservation Program and these measures shall be implemented prior to and concurrent with project construction, as applicable. Measures may include salvage of rare plants prior to construction, transfer of salvaged plants within similar habitat in non-impacted areas, followed up with monitoring by a qualified biologist to confirm at least 80% survival of salvaged plants.

Vegetation Communities

Future development and redevelopment which could occur under the Incentive District could result in direct impacts to riparian habitat and other sensitive natural communities through habitat removal or alteration, specifically within non-developed areas southwest of the intersection of Eaton Street and South Coast Highway, immediately north of Loma Alta Creek and along the railroad tracks. In addition, potential indirect effects, such as spread of invasive species or generation of construction-related runoff, sedimentation, or dust, may occur to adjacent vegetation communities associated with Loma Alta Creek and Buena Vista Lagoon. However, implementation of MM Incentive District BIO-5 would reduce direct and indirect impacts to adjacent vegetation communities from habitat removal or alteration, invasive species, construction-related runoff, sedimentation, and dust to less than significant.

MM Incentive District BIO-5: Impacts to Sensitive Vegetation Communities - To avoid indirect and direct impacts to riparian habitats and sensitive natural communities near the San Luis Rey River, Loma Alta Creek, and Buena Vista Lagoon, the following measures shall be implemented:

a. For non-developed areas southwest of the intersection of Eaton Street and South Coast Highway, immediately north of Loma Alta Creek and along the railroad tracks, the following measures shall be implemented to protect sensitive riparian or upland vegetation communities.

i. A site-specific assessment of biological resources by qualified biologist shall be conducted to confirm the absence or presence of sensitive biological resources prior to the City's approval of project plans. The qualified biologist shall determine the site-specific habitat type.

ii. If the vegetation communities outlined in Table 6-1 would not be directly impacted by the proposed development project, no further assessment would be required.

iii. If there is potential for riparian, wetland, and/or sensitive upland communities to be impacted, these impacts would be required to be compensated according to vegetation community type at the ratios provided in Table 6-1 which supports the Multiple Habitat Conservation Program policy for no net loss of wetland/riparian vegetation and incorporates the mitigation ratios implemented in the City Subarea Plan. For impacts to these riparian and upland areas, a restoration/revegetation plan shall be prepared by a qualified restoration ecologist (experienced with riparian and upland restoration/revegetation planning) in coordination with the City and implemented by an experienced restoration contractor, with oversight by the City.

TABLE 6-1
MITIGATION RATIOS FOR IMPACTS TO VEGETATION COMMUNITIES

Vegetation Community/Land Cover Type	MHCP Habitat Group[1]	Location of Impact within Coastal Zone, Pre-approved Mitigation Area[2], or FPA	Location of Impact Outside of FPA
Riparian and Wetlands[1]			
Disturbed Wetland (11200)	A	1:1 to 2:1	1:1 to 2:1
Emergent Wetland (52440)	A	4:1	4:1
Coastal Brackish Marsh (52200)	A	4:1	4:1
Coastal and Valley Freshwater Marsh (52410)	A	4:1	4:1
Brackishwater Estuary (64133)	A	4:1	4:1
Non-Vegetated Floodplain or Channel (64200)	A	1:1 to 2:1	1:1 to 2:1
Non-Native Riparian (65000)	A	3:1	3:1
Uplands			
Diegan Coastal Sage Scrub (32500)	C	3:1	3:1
Flat-topped Buckwheat (32800)	D	1:1	0.5:1

[1] The wetlands mitigation ratios should provide a standard for each habitat type but may be adjusted depending on the functions and values of both the impacted wetlands as well as the wetlands mitigation proposed by the project. The City may also consider the types of wetland habitat being impacted and utilized for mitigation in establishing whether these standards have been met. All impacts to riparian/wetland habitats and mitigation for such impacts must be reviewed and approved by Federal and State agencies with jurisdiction over these vegetation communities.

[2] Pre-approved mitigation areas are depicted on Figure 6

SOURCE: SANDAG 2003; City of Oceanside 2010.

b. The City shall prohibit the use of species with a rating of moderate or high on the California Invasive Plant Council Inventory Database in landscape plans used for

development southwest of the corner of Eaton Street and South Coast Highway that is adjacent to undeveloped habitat.

c. In areas where there is potential for erosion or construction-generated runoff, sedimentation, or dust from construction activities to impact adjacent Habitat Group A through E communities, best management practices (BMPs), such as silt fencing and/or straw waddles, shall be installed on the downslope portion of grading or disturbance areas during project construction activities. This measure applies to development southwest of intersection of Eaton Street and South Coast Highway and adjacent to Loma Alta Creek.

Jurisdictional Wetlands and Waters

Jurisdictional wetlands and waters within the Incentive District include Loma Alta Creek, a small patch of coastal brackish marsh comprised of saltgrass (*Distichlis* sp.) associated with Buena Vista Lagoon, and a small isolated disturbed wetland near the intersection of Cassidy Street and Broadway Street. Loma Alta Creek is within a concrete flood control channel; therefore, development activities associated with the Incentive District are unlikely to occur at this location. The disturbed wetland located near the intersection of Cassidy Street and Broadway Street is within the rail corridor which is designated as Public Utility Transportation Zone. This area is not considered developable per the land use/zoning designation. Additionally, all wetland areas within the Incentive District are subject to the no net loss policies of the MHCP and City Subarea Plan. While no significant impacts are anticipated to currently known wetland resources, the presence and distribution of wetland resources can change over time and a formal wetland delineation was not conducted throughout the entire Incentive District area; therefore, to ensure no impacts to jurisdictional wetlands and waters would occur, the following measure shall be implemented.

MM Incentive District BIO-6: Wetlands and Waters - Individual development projects implemented under the Incentive District that would impact the areas southwest of the intersection of Eaton Street and South Coast Highway or adjacent to or within Loma Alta Creek may include jurisdictional wetlands or waters and shall be subject to a site-specific assessment of biological resources prior to the City's approval of project plans. If it is determined through the site-specific assessment that excavation, fill, or other modification of wetlands and waters under the jurisdiction of the United States Army Corps of Engineers (USACE), Regional Water Quality Control Board, and California Department of Fish and Wildlife would occur as a result of the project, the project proponent shall be required to conduct a formal jurisdictional delineation in accordance with the *U.S. Army Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987), and *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008). Permits from the respective regulatory agencies shall also be required, and will likely require mitigation resulting in no net loss of jurisdictional wetlands and waters. It is intended that implementation of the mitigation required through the project permits be consistent and meet the Multiple Habitat Conservation Program goal of no net loss of jurisdictional wetlands and waters.

Wildlife Movement and Habitat Linkages

Future development that may occur under the Incentive District would be prioritized within urban/developed areas which have limited potential to support wildlife movement or habitat linkages, but may occur within undeveloped habitat that function as habitat linkages. These types of impacts are consistent with those direct impacts discussed for sensitive vegetation communities such as habitat removal or alteration, and indirect impacts such as invasive species, construction-related runoff, sedimentation, and dust. Implementation of MM Incentive District BIO-5 would reduce direct and indirect impacts to habitat linkages to less than significant. Also, indirect impacts due to noise are not expected because the Incentive District is greater than 300 feet from areas identified as wildlife corridor planning zones in the City Subarea Plan.

7. Conclusion

Based on this review of biological resources within the BSA, implementation of the proposed project has the potential to impact vegetation communities, jurisdictional wetlands and waters, special-status species, and wildlife corridors. However, with implementation of mitigation measures outlined in Section 6, no significant impacts to biological resources would be expected to occur with implementation of the proposed project.

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APPENDIX A
Figures

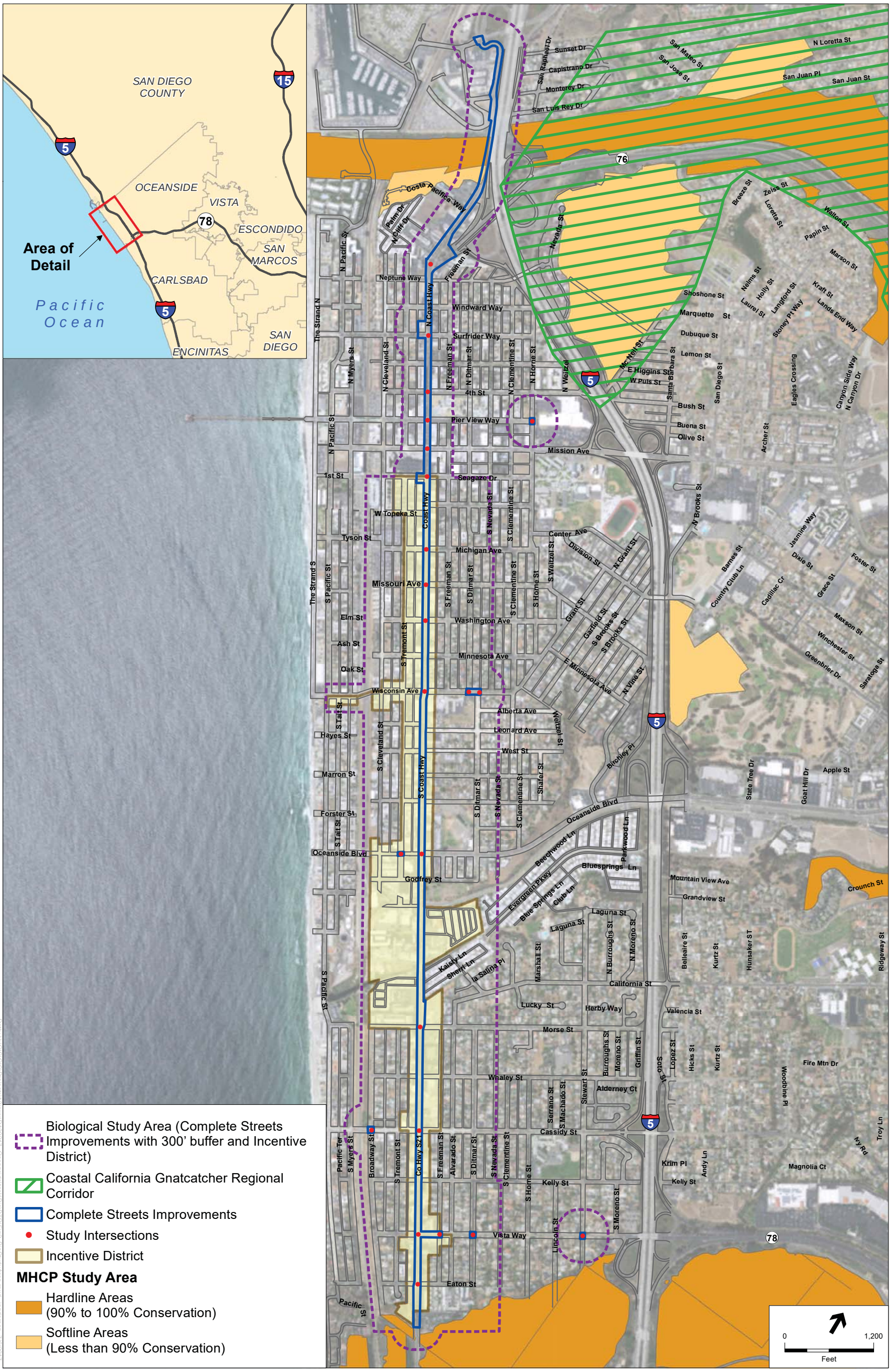


SOURCE: City of Oceanside 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 1

Project Area and Vicinity

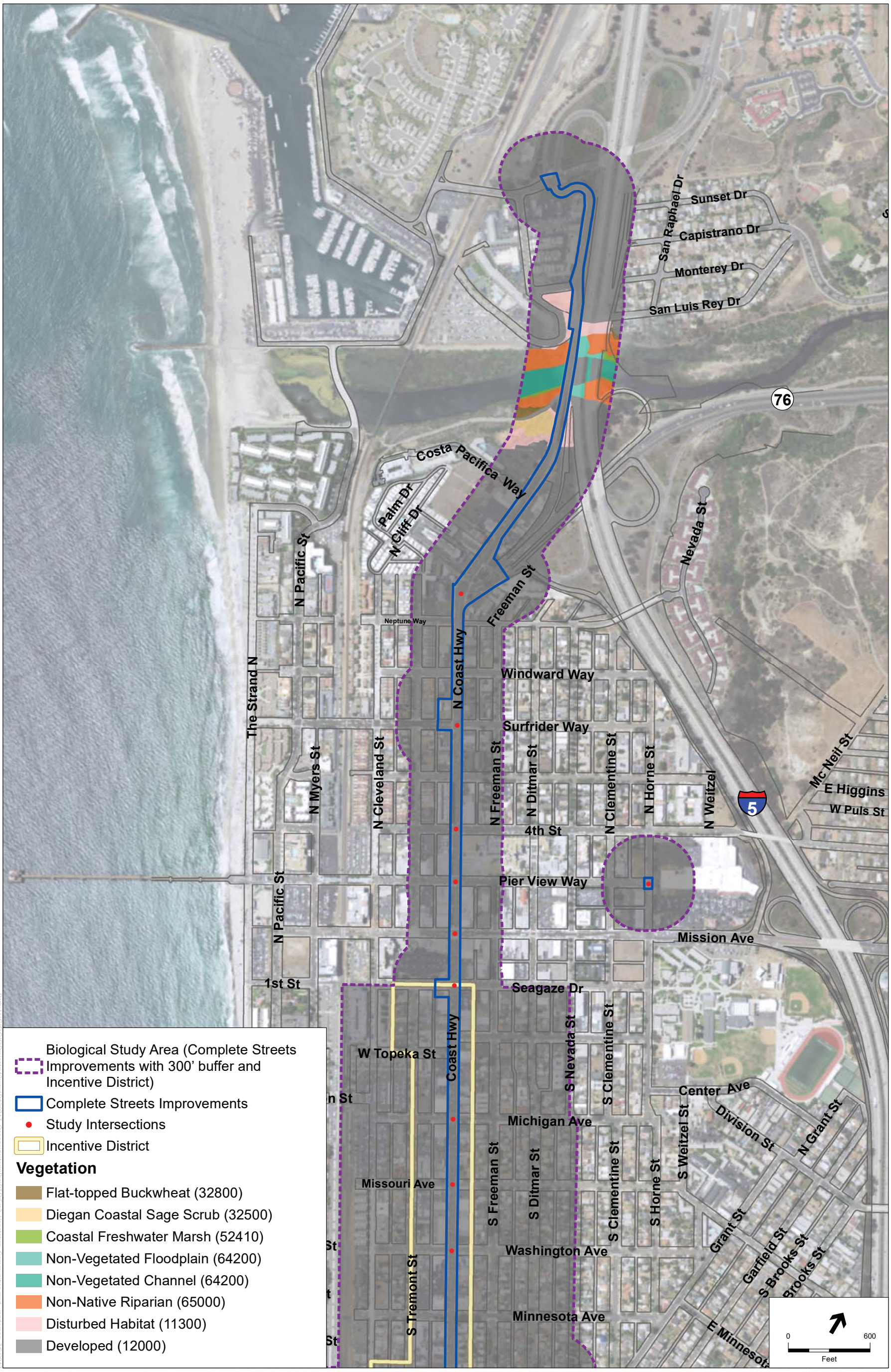


SOURCE: City of Oceanside 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 2

Project Biological Study Area

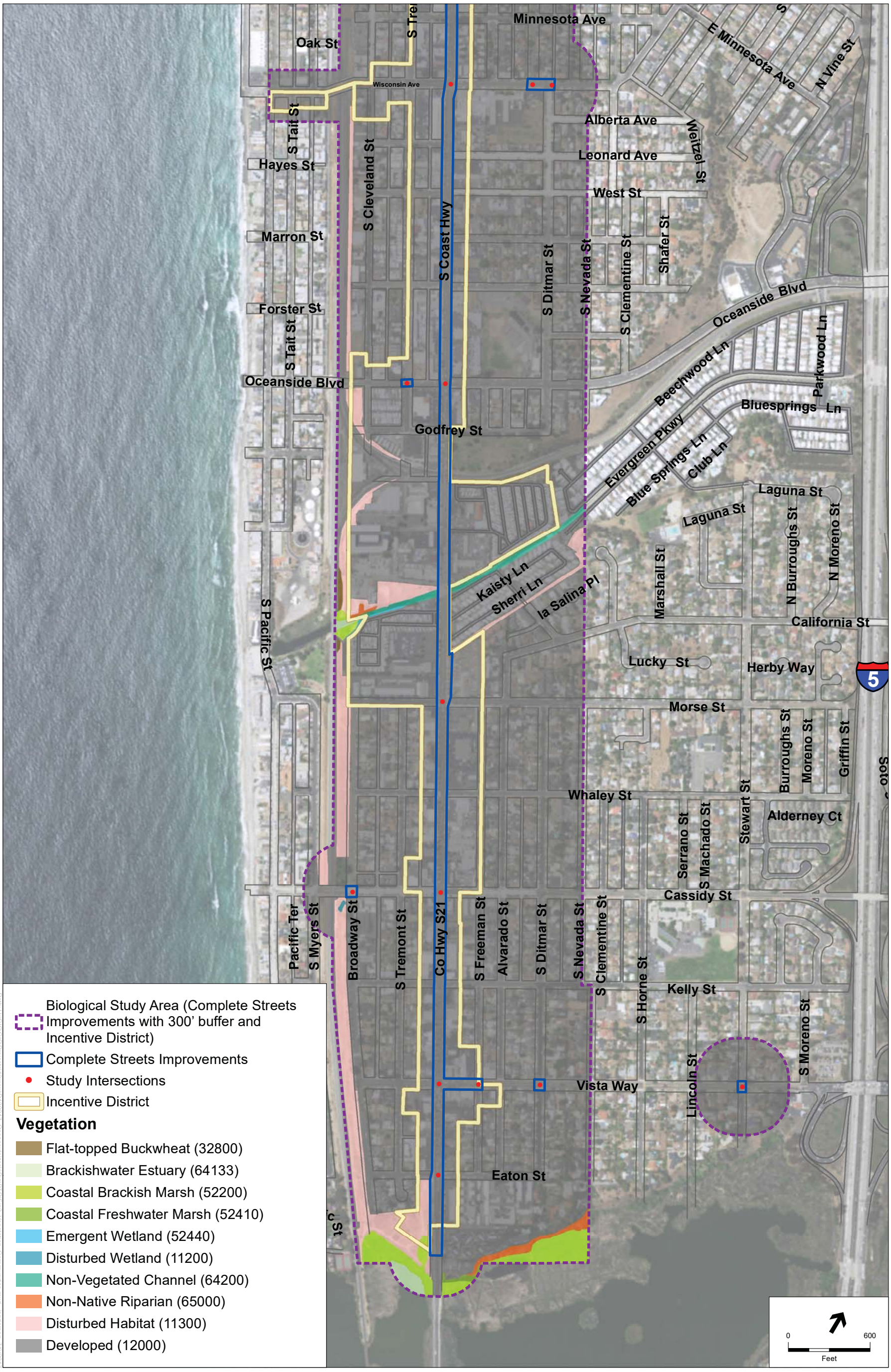


SOURCE: City of Oceanside 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 3

Vegetation Communities

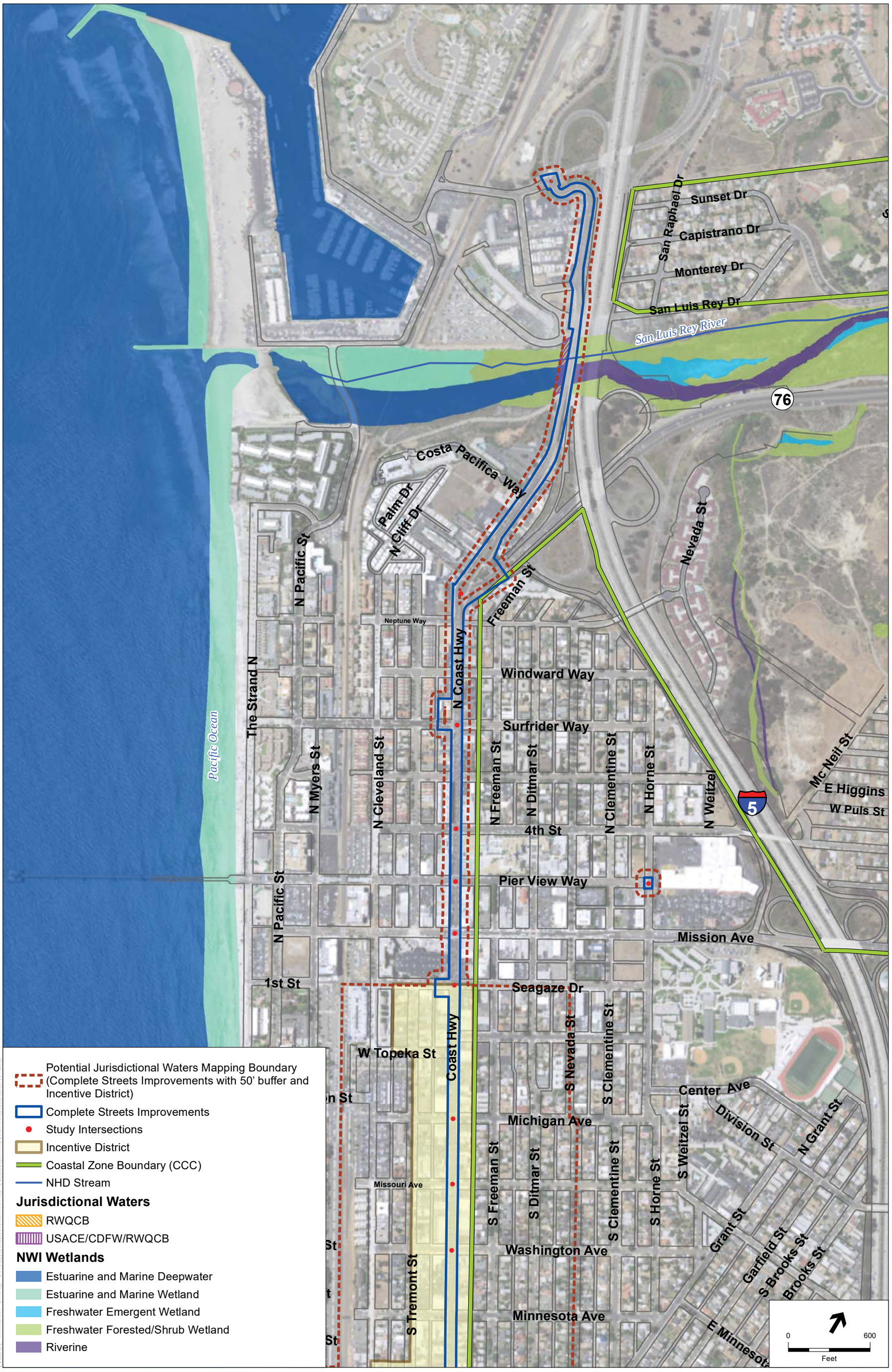


SOURCE: City of Oceanside 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 3

Vegetation Communities

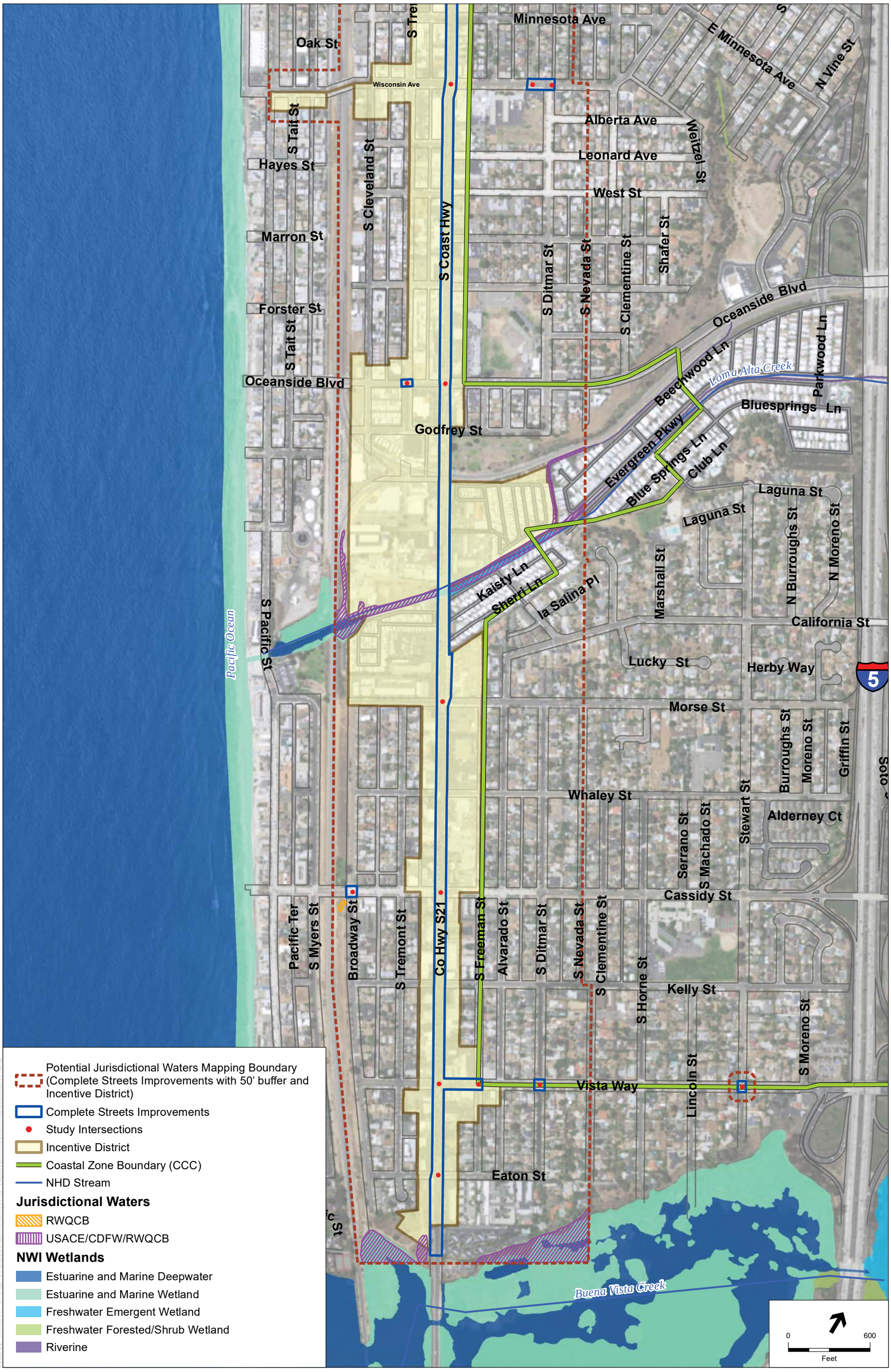


SOURCE: City of Oceanside 2016, National Wetlands Inventory, National Hydrography Dataset, California Coastal Commission

City of Oceanside Coast Highway Corridor Study. 130217

Figure 4

Jurisdictional Waters



SOURCE: City of Oceanside 2016, National Wetlands Inventory, National Hydrography Dataset, California Coastal Commission

City of Oceanside Coast Highway Corridor Study. 130217

Figure 4

Jurisdictional Waters

One Mile Boundary
Complete Streets Improvements
Study Intersection
Incentive District

Sanbios Occurrences

3 Belding's savannah sparrow
7 California gnatcatcher
15 Least Bell's vireo
17 Light footed clapper rail
20 Pacific pocket mouse
23 San Diego black tailed jackrabbit
25 Two stripe garter snake
26 Western burrowing owl
28 Western yellow bat

USFWS Species Occurrences

1 California least tern
2 coastal California gnatcatcher
3 least Bell's vireo
4 light-footed Ridgway's rail
5 tidewater goby

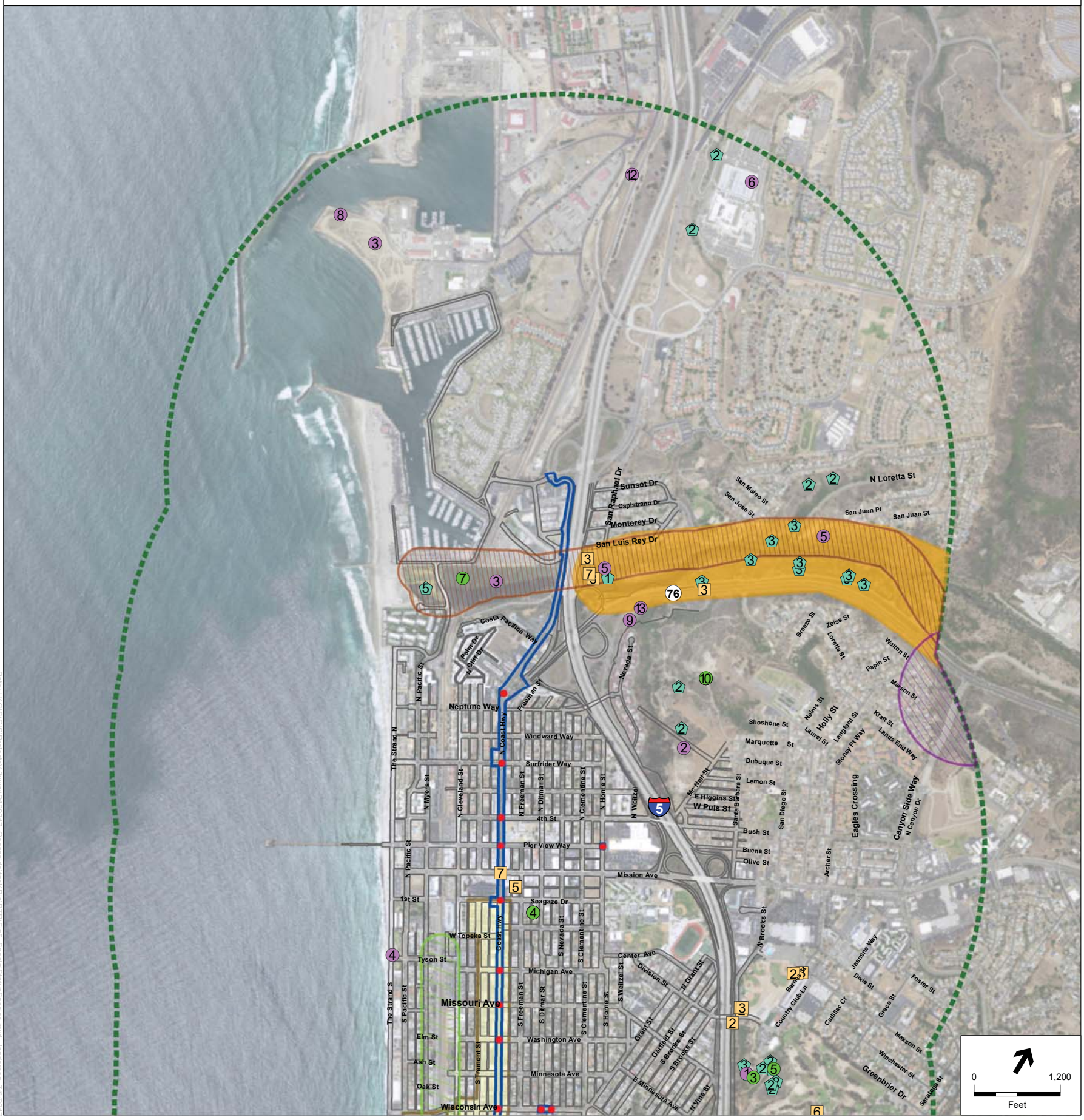
CNDDB Occurrences

Plants

1 Blochman's dudleya
2 Coulter's saltbush
3 Nuttall's acmispon
4 Orcutt's pincushion
5 San Diego barrel cactus
6 San Diego button-celery
7 coast woolly-heads
8 decumbent goldenbush
9 sea dahlia
10 slender cottonheads
11 smooth tarplant
12 spreading navarretia
13 sticky dudleya
Orcutt's pincushion
Cliff Spurge
Sticky Dudleya

Animals

1 Belding's savannah sparrow
2 California least tern
3 San Diego black-tailed jackrabbit
4 bank swallow
5 coastal California gnatcatcher
6 lesser long-nosed bat
7 light-footed clapper rail
8 pocketed free-tailed bat
9 red-diamond rattlesnake
10 southern California rufous-crowned sparrow
11 tidewater goby
12 western snowy plover
13 western yellow bat
14 white-faced ibis
Coastal California Gnatcatcher
Least Bell's Vireo
Tidewater Goby



SOURCE: City of Oceanside 2016; CNDDB 2016; SanGIS 2016; USFWS 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 5

Special Status Species



One Mile Boundary

Complete Streets Improvements

Study Intersection

Incentive District

Sanbios Occurrences

- 3 Belding's savannah sparrow
- 7 California gnatcatcher
- 15 Least Bell's vireo
- 17 Light footed clapper rail
- 20 Pacific pocket mouse
- 23 San Diego black tailed jackrabbit
- 25 Two stripe garter snake
- 26 Western burrowing owl
- 28 Western yellow bat

USFWS Species Occurrences

- 1 California least tern
- 2 coastal California gnatcatcher
- 3 least Bell's vireo
- 4 light-footed Ridgway's rail
- 5 tidewater goby

CNDDB Occurrences

Plants

- 1 Blochman's dudleya
- 2 Coulter's saltbush
- 3 Nuttall's acmispon
- 4 Orcutt's pincushion
- 5 San Diego barrel cactus
- 6 San Diego button-celery
- 7 coast woolly-heads
- 8 decumbent goldenbush
- 9 sea dahlia
- 10 slender cottonheads
- 11 smooth tarplant
- 12 spreading navarretia
- 13 sticky dudleya

Orcutt's pincushion

Cliff Spurge

Sticky Dudleya

Animals

- 1 Belding's savannah sparrow
- 2 California least tern
- 3 San Diego black-tailed jackrabbit
- 4 bank swallow
- 5 coastal California gnatcatcher
- 6 lesser long-nosed bat
- 7 light-footed clapper rail
- 8 pocketed free-tailed bat
- 9 red-diamond rattlesnake
- 10 southern California rufous-crowned sparrow
- 11 tidewater goby
- 12 western snowy plover
- 13 western yellow bat
- 14 white-faced ibis

Coastal California Gnatcatcher

Least Bell's Vireo

Tidewater Goby

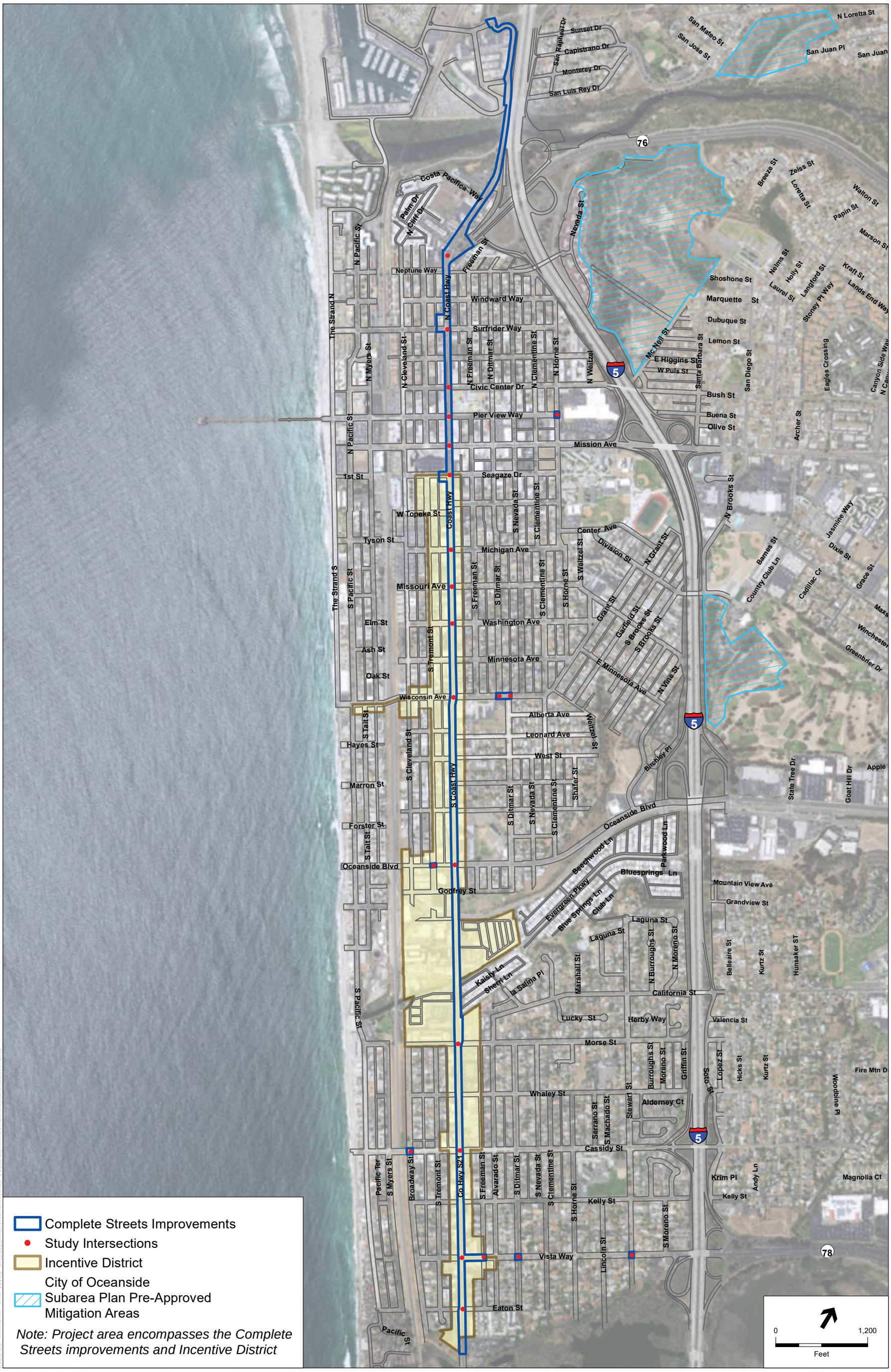
Path: U:\GIS\GISProjects\13xxx\D130217_OceansideHabitatBioBTR\Fig5_SpecialStatusSpecies.mxd janderson 7/6/20

SOURCE: City of Oceanside 2016; CNDDB 2016; SanGIS 2016; USFWS 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 5

Special Status Species



SOURCE: City of Oceanside 2016; SanGIS 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 6

City of Oceanside Subarea Plan Pre-Approved Mitigation Areas

APPENDIX B
Site Photographs



1 – Outer extent of coastal brackish marsh associated with Buena Vista Lagoon where *Typha* transitions into *Distichlis.*



2 – Loma Alta Creek concrete-lined channel.



3 – Lower (western) segment of Loma Alta Creek with marsh habitat.



4 – Southwest side of San Luis Rey River, showing coastal sage scrub slope in foreground and non-native riparian in background.



5 – Highway overpass at San Luis Rey River, showing unvegetated floodplain.



6 – Disturbed habitat, possibly undergoing restoration and eucalyptus removal on southwest side of San Luis Rey River.

APPENDIX C

CNDDB Special-Status Species Records within One Mile

Scientific Name	Common Name	Presence	Most Recent Year of Record	Age of Record (since 2016)	Federal Status	State Status	California Rare Plant Rank	CDFW Status
Plants								
Acmispon prostratus	Nuttall's acmispon	Presumed Extant	2001	15	None	None	1B.1	-
Atriplex coulteri	Coulter's saltbush	Presumed Extant	2014	2	None	None	1B.2	-
Centromadia pungens ssp. laevis	smooth tarplant	Presumed Extant	1897	119	None	None	1B.1	-
Chaenactis glabriuscula var. orcuttiana	Orcutt's pincushion	Possibly Extirpated	1933	83	None	None	1B.1	-
Dudleya blochmaniae ssp. blochmaniae	Blochman's dudleya	Presumed Extant	2001	15	None	None	1B.1	-
Dudleya viscida	sticky dudleya	Presumed Extant	Unk.	-	None	None	1B.2	-
Eryngium aristulatum var. parishii	San Diego button-celery	Possibly Extirpated	1897	119	Endangered	Endangered	1B.1	-
Ferocactus viridescens	San Diego barrel cactus	Presumed Extant	1979	37	None	None	2B.1	-
Ferocactus viridescens	San Diego barrel cactus	Presumed Extant	2015	1	None	None	2B.1	-
Leptosyne maritima	sea dahlia	Presumed Extant	2014	2	None	None	2B.2	-
Nemacaulis denudata var. denudata	coast woolly-heads	Presumed Extant	1933	83	None	None	1B.2	-
Nemacaulis denudata var. gracilis	slender cottonheads	Possibly Extirpated	1923	93	None	None	2B.2	-
Fish								
Eucyclogobius newberryi	tidewater goby	Possibly Extirpated	1984	32	Endangered	None	-	SSC
Reptiles								
Crotalus ruber	red-diamond rattlesnake	Presumed Extant	1993	23	None	None	-	SSC

Scientific Name	Common Name	Presence	Most Recent Year of Record	Age of Record (since 2016)	Federal Status	State Status	California Rare Plant Rank	CDFW Status
Birds								
Aimophila ruficeps canescens	southern California rufous-crowned sparrow	Presumed Extant	1993	23	None	None	-	WL
Charadrius alexandrinus nivosus	western snowy plover	Extirpated	1995	21	Threatened	None	-	SSC
Passerculus sandwichensis beldingi	Belding's savannah sparrow	Presumed Extant	2001	15	None	Endangered	-	
Plegadis chihi	white-faced ibis	Presumed Extant	1979	37	None	None	-	WL
Polioptila californica californica	coastal California gnatcatcher	Presumed Extant	1980	36	Threatened	None	-	SSC
Polioptila californica californica	coastal California gnatcatcher	Presumed Extant	1993	23	Threatened	None	-	SSC
Polioptila californica californica	coastal California gnatcatcher	Presumed Extant	2001	15	Threatened	None	-	SSC
Rallus longirostris levipes	light-footed clapper rail	Presumed Extant	2007	9	Endangered	Endangered	-	FP
Rallus longirostris levipes	light-footed clapper rail	Possibly Extirpated	2007	9	Endangered	Endangered	-	FP
Riparia riparia	bank swallow	Extirpated	1925	91	None	Threatened	-	
Sternula antillarum browni	California least tern	Presumed Extant	1992	24	Endangered	Endangered	-	FP
Mammals								
Lasiurus xanthinus	western yellow bat	Presumed Extant	1985	31	None	None	-	SSC
Leptonycteris yerbabuenae	lesser long-nosed bat	Presumed Extant	1996	20	Endangered	None	-	
Lepus californicus bennettii	San Diego black-tailed jackrabbit	Presumed Extant	2001	15	None	None	-	SSC
Nyctinomops femorosaccus	pocketed free-tailed bat	Presumed Extant	1986	30	None	None	-	SSC

Appendix E1

Supplemental Cultural Resources Memo

ESA

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Los Angeles, CA 90017-2934
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www.esassoc.com

memorandum

date October 2, 2018

to City of Oceanside, Engineering Division

from Joel Levanetz, AICP, RPA – ESA
Michael Vader – ESA

subject Coast Highway Corridor Study – Supplemental Cultural Resources Assessment Memorandum

Introduction

The City of Oceanside (City) has retained Environmental Science Associates (ESA) to prepare an Environmental Impact Report (EIR) pursuant to the California Environmental Quality Act (CEQA) for the Coast Highway Corridor Study Project (project, or proposed project). In 2016, ESA prepared a Phase I cultural resources assessment report in support of the EIR (ESA 2016). The Phase I cultural resources assessment included archival research in the form of a records search prepared by the California Historical Resources Inventory System (CHRIS) South Coast Information Center (SCIC), and a pedestrian cultural resources survey of the project area. The SCIC records search and pedestrian survey identified the presence of 21 previously recorded cultural resources within or adjacent to the project area, including one prehistoric archaeological site, and 20 historic architectural resources. The 2016 Phase I cultural resources assessment addressed potential project impacts to these 21 resources and concluded that none would be significantly impacted by project implementation.

Subsequent to the completion of the Phase I cultural resources assessment, City staff provided ESA with a City Council resolution (Resolution No. R97-169) for the designation of Coast Highway (also known as Hill Street) as Historic California U.S. Route 101. On November 19, 1997, the City Council passed the resolution describing the Coast Highway's importance to the growth of Oceanside and identifying it as significant to the City's heritage. Therefore, for the purposes of this project, the Coast Highway is being considered an architectural resource that is discretionarily determined to be a historical resource pursuant to CEQA. The archival research conducted as part of the Phase I cultural resources assessment did not identify the Coast Highway as a cultural resource, and an analysis of potential project impacts to the highway was not included as part of the original 2016 assessment. As such, this technical memorandum has been prepared to address potential project impacts to the Coast Highway and is a supplement to the Phase I cultural resources assessment prepared in 2016. This memorandum provides a brief history of the Coast Highway as well as an analysis of the potential for the project to significantly impact the segment of the linear resource within the project area.

Project Location and Description

The project is located within the city in northern San Diego County, approximately 32 miles north of the city of San Diego and 70 miles south of Los Angeles (**Figure 1**). The project encompasses the Coast Highway corridor from Harbor Drive in the north to approximately 550 feet south of Eaton Street on the south. Specifically, the project is located within Sections 22, 23, 26, 35, and 36 of Township 11 South, Range 5 West, on the Oceanside and San Luis Rey (CA) United States Geological Survey 7.5-minute topographic quadrangles (**Figure 2**).

The project consists of two components, the Complete Streets improvements, analyzed at a project-level, and the Coast Highway Incentive District (herein referred to as the Incentive District), an optional zoning program, analyzed at the programmatic level (**Figure 3**). The 2016 Phase I cultural resources assessment used the term "Overlay" for the optional zoning program, but the name has been changed to "Incentive District" since completion of that report. The Complete Streets improvements span approximately 3.5 miles from the northern terminus of Coast Highway at Harbor Drive to Eaton Street near the city's southern boundary and would include enhancements to the existing roadway infrastructure as well as bicycle and pedestrian facilities throughout the corridor. Specifically, the Complete Streets improvements would convert Coast Highway from four lanes to two lanes (one travel lane in each direction) for the length of the corridor, with segments of two southbound travel lanes between State Route (SR) 76 and Surfrider Way, and south of Kelly Street to Eaton Street. Further, key elements of the Complete Streets improvements include a continuous Class II striped bicycle lane from Harbor Drive to the southern city limit, 10 mid-block crosswalks to facilitate safe and convenient pedestrian crossings of the corridor, 12 roundabouts in place of traffic signals where physically feasible and where the intersection traffic volumes support implementation, traffic-calming measures, and streetscape enhancements, such as removing dead trees and replanting new trees.

The Incentive District would extend in an irregular shape from Seagaze Drive to the north past Eaton Street to the south, and would extend from Ditmar Street on the east to Pacific Street on the west. The Incentive District would provide optional regulations and standards that a developer or property owner may choose in lieu of the existing underlying zoning. If adopted, the Incentive District would be an optional zoning program, and individual developers could choose to apply for new development or redevelopment within the Incentive District boundary. Implementation of the Incentive District would require amendments to the City's existing General Plan and Zoning Ordinance.

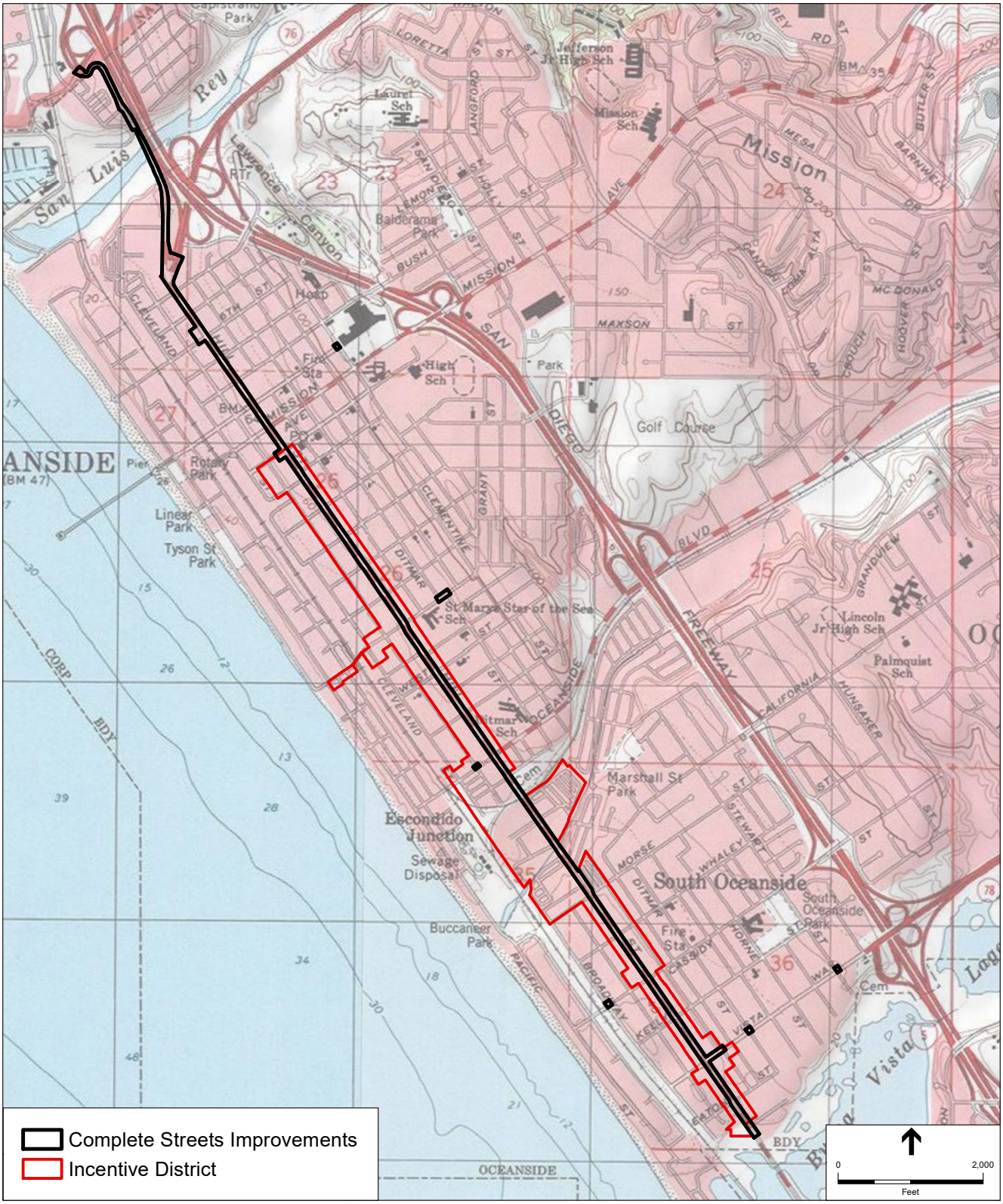


SOURCE: ESRI; SanGIS 2015

Coast Highway Corridor Study. 130217

Figure 1

Regional Location



TOPOQUAD: Oceanside and San Luis Rey USGS 7.5-minute Topo Quads

Coast Highway Corridor Study. 130217.00

Figure 2
Project Location



SOURCE: City of Oceanside 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 3

Project Area and Vicinity

History of the Coast Highway

The following discussion is excerpted from, *The Role of Transportation in the Growth of the City of Oceanside* (Flannigan 1996), and provides a brief history of the Coast Highway and its role in the development of Oceanside's economy and growth from the early to the mid-20th century.

> *The Coast Highway, also known as Highway 101, extends approximately 970-miles from San Diego at its southern terminus to Oregon in the north. Approximately 70 miles of the highway traverses San Diego County from north to south, and an approximately 3.5-mile long segment bisects the city of Oceanside.*
>
> *Originally known as Hill Street, the Coast Highway within Oceanside had humble beginnings. At the beginning of the 20th century, Hill Street was merely a dirt road through the center of town that became an impassible quagmire of mud during the rainy season. However, with the growing popularity of the automobile in the late 19th and early 20th centuries, the San Diego County Road Commission was formed in 1908 and was tasked with the development of 1,250 miles of roads throughout the county. Oceanside petitioned the commission for a highway along the coast extending from the city of San Diego in the south to Orange County in the north. By June 1909, two routes involving Oceanside were proposed. The first route would extend from San Diego to Oceanside and the second would extend from Oceanside to the border of San Diego and Orange counties near San Onofre. By June 1911, the dirt road that constituted the Coast Highway opened to motorist. With the opening of the road, the Automobile Club of Southern California included Oceanside in its official map marking roadways suitable for automobiles, literally putting Oceanside on the map and opening it up to automobile-based tourism and commerce. Although the road was opened in 1911, the highway was not fully straightened and paved until November 1915. With the completion of the Coast Highway in San Diego County, Oceanside became the gateway to San Diego, as it was the first city that motorists passed through when entering San Diego County from the north. At this time, Oceanside's population and economy expanded as business catering to motorists began to open on Hill Street, and included garages, cafes, and hotels.*
>
> *During the 1920s, Hill Street and the larger Coast Highway were improved as southern California's automobile cultural grew and the need for better roads increased. The road improvements allowed a greater volume of motorists to pass through Oceanside leading to additional economic expansion as new business opened and residential subdivisions were built. Oceanside's Chamber of Commerce actively lured tourists to the area by constructed signs advertising the San Luis Rey Mission as a draw to the area. In 1925, the precursor to the Federal Highway Administration formally assigned the Coast Highway the U.S. Route 101 designation.*
>
> *As traffic on the Coast Highway increased through the 1920s, Oceanside's City Trustees determined that congestion along Hill Street was becoming problematic and enacted a parallel parking policy in 1928. Prior to this, parking along Hill Street was angled, which allowed for a greater number of parking spaces, but narrowed the road. Additional changes came in 1933 when the State Highway Division determined that the Hill Street segment of the Coast Highway created a traffic bottleneck, and deemed it necessary to widen the street to relieve congestion. Similarly, in 1940, Oceanside City Trustees passed an ordinance to expand Hill Street from a 2-lane highway to*

a 4-lane highway to relieve the ever-present traffic problems. In 1945 and 1948, traffic signals were installed at multiple intersections of along Hill Street to further relieve congestion.

By 1947, increasing congestion, not only within Oceanside, but along the larger Coast Highway, motivated the State Highway Commission to propose a new freeway that would replace U.S. Route 101. The new freeway would be located adjacent to, but bypass the communities along its route to provide a barricade-free corridor for the expanding automobile use in southern California. Oceanside's business interests took umbrage to the freeway proposal over concerns regarding diminished commerce associated with the city's economic orientation to motorists. By 1953 construction of the new freeway, Interstate 5, was completed approximately 0.5 miles east of Hill Street, greatly diminishing the daily traffic passing through Oceanside. Today, the Coast Highway through Oceanside is a 4-lane road bounded by commercial businesses, with a bustling economy centered on tourism.[1]

Impacts Assessment

The segment of the Coast Highway within the project area is a historic-period linear property that, at the discretion of the City of Oceanside, has been determined to be historically significant by a lead agency, and therefore qualifies as a historical resource pursuant to CEQA. The project would include converting Coast Highway from four lanes to two lanes, installing a Class II striped bicycle lane from Harbor Drive to the southern city limit, creating 10 mid-block crosswalks to facilitate safe and convenient pedestrian crossings of the corridor, constructing 12 roundabouts in place of traffic signals where physically feasible, and implementing streetscape enhancements, such as removing dead trees and replanting new trees. These actions need to be considered to determine whether they have the potential to impact the significance of the Coast Highway should the project be implemented, which is the subject of the analysis contained herein.

As noted above, the Coast Highway has been a significant factor in the growth of Oceanside from the early to the mid-20th century. When the highway opened in the early 1900s, Oceanside became the gateway to San Diego and its economy developed to cater to motorists with the construction of auto garages, hotels, and cafes, which in turn led to the growth of the city. Since the Coast Highway was formally completed in 1915, the Hill Street portion of the highway segment within Oceanside has undergone a number of alterations. These alterations were largely a result of increasing automobile traffic creating congestion along the transportation corridor and included the reconfiguration of angled parking to parallel parking in the 1920s, widening the street in the 1930s, expanding the roadway from a two-lane to a four-lane highway in the 1940s, and the installation of traffic signals in the 1940s. As is the case with most major roads or highways, routine maintenance and upgrades are enacted over the life of the transportation corridor to ensure it remains safe for public use.

The Coast Highway is an example of how a historic-period highway evolved over time as the degree of use increased, and as new technologies and configurations were introduced to address issues such as traffic congestion and safety. Although these cumulative changes have altered the Coast Highway over the years, the resource has maintained its original alignment and function, as well as its association with events that have led to Oceanside's growth. As noted above, the major proposed project alterations to the highway would include reconfiguring it from a four-lane road to two lanes and the installation of 12 roundabouts. These proposed project

[1] Flannigan, Kathy. 1996. *The Role of Transportation in the Growth of the City of Oceanside*. On file at the City of Oceanside, Planning Department.

actions are consistent with the alterations to the Coast Highway that have been carried out since it was opened in 1908 and completed in 1915. Furthermore, the project would alter only a 3.5-mile-long segment of the larger 70-mile-long Coast Highway within San Diego County. The proposed project alternations would not realign the highway, and any visual changes that may occur would be virtually imperceptible to the overall setting of the 70-mile-long San Diego County segment of the Coast Highway.

As described above, the Coast Highway has also undergone a number of changes since its formal completion in 1915. Given its varied history, the significance of the roadway segment is not based on physical architectural elements or features but rather its association with the growth of Oceanside from a small coastal town to one of the largest cities in San Diego County. As such, the project would not impact the Coast Highway's ability to convey its significance because the physical and visual alterations proposed would not impact the resource's ability to convey its historic association with the growth of Oceanside. In fact, these actions are in line with the historical trends that lent the resource its current significance. Therefore, project implementation would not result in impacts to the Coast Highway's significance as a historical resource pursuant to CEQA.

Summary and Conclusions

The Coast Highway is a historic architectural resource that has been discretionarily determined by the City to qualify as a historical resource pursuant to CEQA. From the early to mid-20th century the Coast Highway was a major economic driver in the City of Oceanside and was largely responsible for the City's growth from the 1920s through the 1950s. Since its opening in 1908, the highway has undergone a number of changes, as is common with most transportation corridors. Proposed project alterations to the highway are consistent with the alterations to the Coast Highway that have been carried out in the past, and would be largely imperceptible to the overall setting of the 70-mile-long San Diego County segment of the Coast Highway. Therefore, project implementation would not result in significant impacts to historical resources pursuant to CEQA and no additional mitigation measures than those included in the 2016 Phase I cultural resources assessment are required.

References

Flannigan, Kathy. 1996. *The Role of Transportation in the Growth of the City of Oceanside*. On file at the City of Oceanside, Planning Department.

Vader, Michael, Chris Lockwood, and Vanessa Ortiz. 2016. Coast Highway Corridor Study Project, Oceanside, California – Phase I Cultural Resources Assessment. Prepared for the City of Oceanside by Environmental Science Associates.

Appendix E2
Cultural Resources Assessment

ESA

Public Version

COAST HIGHWAY CORRIDOR STUDY PROJECT, OCEANSIDE, CALIFORNIA

Phase I Cultural Resources Assessment

Prepared for
City of Oceanside
300 North Coast Hwy
Oceanside, CA 92054

December 2016

ESA



Public Version

COAST HIGHWAY CORRIDOR STUDY PROJECT, OCEANSIDE, CALIFORNIA

Phase I Cultural Resources Assessment

Prepared for
City of Oceanside
300 North Coast Hwy
Oceanside, CA 92054

December 2016

Prepared by:
ESA
550 West C Street, Suite 750
San Diego, CA 92101

Principal Investigator:
Michael R. Bever, Ph.D., R.P.A

Authors:
Michael Vader, B.A.
Chris Lockwood, Ph.D., R.P.A.
Vanessa Ortiz, M.A., R.P.A.

Project Location:
Oceanside and San Luis Rey (CA) USGS 7.5-minute Topographic Quads
Sections 22, 23, 26, 35, and 36 of Township 11 South, Range 5 West

Acreage:
Complete Streets Improvements Area: 3.5 linear miles
Incentive District: Approx. 154 acres

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EXECUTIVE SUMMARY

Coast Highway Corridor Study Project, Oceanside, CA
Phase I Cultural Resources Assessment

Environmental Science Associates (ESA) has been retained by the City of Oceanside (City) to prepare an Environmental Impact Report (EIR) pursuant to the requirements of the California Environmental Quality Act (CEQA) for the Coast Highway Corridor Project (proposed project or project). The proposed project would modify an approximate 3.5-mile-long segment of the Coast Highway corridor that runs through the City to encourage redevelopment and revitalization of the area. Proposed modifications include lane conversions, street improvements, intersection roundabouts, and increased parking and bicycle facilities, as well as an amendment to the Zoning Ordinance to create a Coast Highway Incentive District (herein referred to as Incentive District). The City is the lead agency responsible for compliance with CEQA. This Phase I Cultural Resources Assessment has been prepared in compliance with CEQA, in support of the project EIR, and includes the results of a records search conducted at the South Coastal Information Center (SCIC), a historic map and aerial photograph review, Native American consultation, a geoarchaeological assessment, and a reconnaissance-level survey of the Coast Highway corridor.

The proposed project is located within the City in northern San Diego County, approximately 32 miles north of the City of San Diego and 70 miles south of Los Angeles. The project would encompass the Coast Highway corridor from Harbor Drive in the north to approximately 550 feet south of Eaton Street on the south. Specifically, the proposed project is located within Sections 22, 23, 26, 35, and 36 of Township 11 South, Range 5 West on the Oceanside and San Luis Rey (CA) USGS 7.5-minute topographic quadrangles.

The proposed project consists of two components, the Complete Streets improvements which are analyzed at a project-level within the EIR and the Incentive District, which is analyzed programmatically in the EIR. The Complete Streets improvements include enhancements to the existing roadway infrastructure as well as bicycle, pedestrian, and transit facilities throughout the corridor. The Incentive District would implement the Coast Highway Vision and Strategic Plan by encouraging redevelopment and revitalization of the Coast Highway corridor. Implementation of the Incentive District would require amendments to the City's existing General Plan and Zoning Ordinance. When referring specifically to each project component, the terms "Complete Streets improvements" and "Incentive District" will be used to describe the individual areas. When referring to the area which encompasses both the Complete Streets improvements and the Incentive District, the term "project area" will be used.

Due to the different levels of analysis for the Complete Streets improvements and the Incentive District, the methods used in this cultural resources assessment differ between the project-level

and programmatic components. The project-level analysis examines the Complete Streets improvements at a site-specific level pursuant to *CEQA Guidelines* Section 15161. The project-level analysis includes a records search conducted at the SCIC, a historic map and aerial review, Native American consultation, a geoarchaeological review, and reconnaissance-level survey of the Coast Highway corridor. The programmatic analysis examines the Incentive District, which would provide optional regulations and standards that a developer or property owner may choose in lieu of the existing underlying zoning. If adopted, the Incentive District would be an optional zoning program that individual developers could choose to apply for new development or redevelopment within the Incentive District boundary. Since future development projects that may fall under the Incentive District are not known at this time, this project component is analyzed at a programmatic level. The programmatic analysis includes the SCIC records search and Native American consultation included in the project-level analysis, but does not include a pedestrian survey of the Incentive District.

A records search for the proposed project, including both the Complete Streets improvements and Incentive District components, was conducted on July 10, 2016, by staff at the California Historical Resources Information System (CHRIS) SCIC housed at San Diego State University. The records search included a review of all recorded cultural resources within a 0.5-mile radius of the project area, as well as a review of cultural resource reports on file. The records search indicates that 123 cultural resources studies have been conducted within a 0.5-mile radius of the project area. One hundred percent of the 0.5-mile radius records search area has been included in previous surveys. Thirty-one of the 123 studies include the project area. The records search indicates that a total of 33 archaeological resources have been previously recorded within 0.5 mile of the project area. Of the 33 previously documented archaeological resources, two (CA-SDI-14058 and -15870) are located within or immediately adjacent to (within 100 feet of) the Complete Streets improvements, and three (CA-SDI-14059 and -17796, and P-36-033869) are located within or immediately adjacent to the Incentive District. None have been evaluated for listing in the California Register of Historical Resources (CRHR).

The records search indicates that 259 historic-period built environment resources have been previously recorded within 0.5 mile of the project area. Of these 259 resources, 27 are located within or immediately adjacent (within 100 feet) to the Complete Streets improvements and Incentive District. Of these 27 resources, 19 are located immediately adjacent to the Complete Streets improvements and eight are located solely within or immediately adjacent to the Incentive District. Of the 19 built environment resources located within the Complete Streets improvements, 11 are also located within the Incentive District. One additional resource, the San Luis Rey River Bridge (Bridge# CA 57 C-322), is not on file at the SCIC, but was identified within the Complete Streets improvements upon review of the Caltrans historic bridge inventory.

A Sacred Lands File (SLF) search for the proposed project was requested from the California Native American Heritage Commission (NAHC) on June 2, 2016. The results provided by the NAHC on June 6, 2016 did not indicate the presence of Native American cultural resources within the project area. Pursuant to the requirements of Assembly Bill 52 (AB 52) and Senate Bill 18 (SB 18), requiring government-to-government consultation, the City sent consultation notification letters via certified mail to Native American groups affiliated with the project area.

The letters included a description of the proposed project, the project location, and a notification of the type of consultation that the City was initiating. To date, the City has received responses from four groups including the San Luis Rey Band of Mission Indians, the Pechanga Band of Mission Indian, the Rincon Band of Luiseño Indians, and the Pala Band of Mission Indians. In letters dated June 20, 2016, Merri Lopez-Keifer, Chief Legal Counsel for the San Luis Rey Band of Mission Indians formally requested that AB 52 and SB 18 consultation with the City be initiated. On August 11, the City conducted formal consultation with Ms. Lopez-Keifer pursuant to AB 52. Ms. Lopez-Keifer requested that eight mitigation measures (MM Complete Streets CR-1 through -8) addressing Tribal Cultural Resources be recommended to the City's decision-making body. The City agreed to incorporate the mitigation measures recommended by Ms. Lopez-Keifer, thus concluding consultation between the City and the San Luis Rey Band of Mission Indians. These mitigation measures are included in the *Summary and Recommendations* section of this report. In letters dated June 10, 2016 and June 14, 2016, Anna Hoover, Cultural Analyst for the Pechanga Band of Mission Indians, stated that the project area falls within the Pechanga's aboriginal territory and requested AB 52 and SB 18 consultation with the City. In a letter dated June 23, 2015, Vincent Whipple, Cultural Resources Manager for the Rincon Band of Luiseño Indians, stated that the proposed project is located within Rincon's specific area of cultural interest, but did not formally request AB 52 or SB 18 consultation with the City. In a letter dated June 16, 2016, Shasta Gaughen, Tribal Historic Preservation Officer for the Pala Band Mission Indians, stated that the proposed project is located within Pala's Traditional Use Area (TUA) and formally requested AB 52 consultation with the City be initiated. To date, Pala has not requested SB 18 consultation with the City.

A desktop geoarchaeological review of the project area was conducted by ESA geoarchaeologist Chris Lockwood, Ph.D., R.P.A. Dr. Lockwood's research indicates that the project area is underlain by late to middle Pleistocene-aged (approximately 80,000 to 200,000 years old) deposits, that due to their age, are considered to have a very low potential to contain archaeological resources, except where the upper portion of this unit has been preserved and overlain by latest Pleistocene and Holocene alluvium or imported fill. Areas containing latest Pleistocene to Holocene alluvium have been mapped at the crossing of the San Luis Rey River, the Loma Alta Creek, and adjacent to Buena Vista Lagoon. Such alluvium is considered to have a high potential to contain buried archaeological resources. Areas containing late Pleistocene to Holocene alluvial deposits (i.e., in the vicinity of the San Luis Rey River, Loma Alta Creek, and Buena Vista Lagoon) are considered sensitive for buried archaeological sites. Other portions of the project area are considered to have a lower potential for intact buried archaeological resources due to the age of the natural surface deposits.

A reconnaissance-level cultural resources survey of the Complete Streets improvements was conducted by ESA archaeologist Michael Vader, B.A. on August 10, 2016. The survey was aimed at identifying historic-period built environment resources within or immediately adjacent to the Complete Streets improvements, as well as any traces of bare ground surfaces that could be inspected for the presence of archaeological resources. Because the Incentive District is being analyzed programmatically it was not included as part of the reconnaissance-level survey conducted for the proposed project. As a result of the cultural resources survey the one archaeological resource (CA-SDI-14058) overlapping the Complete Streets improvements area

was revisited and 17 of the 20 previously documented built environment resources were identified. Resource CA-SDI-15870, a prehistoric archaeological site located immediately adjacent to the Complete Streets improvements, was not revisited because its mapped location is within the San Luis Rey River.

The Complete Streets improvements were subject to a project-level analysis which consisted of a records search, historic map and aerial review, Native American consultation, a geoarchaeological review, and a reconnaissance-level survey. The SCIC records search indicates that 33 previously recorded archaeological resources have been documented within a 0.5–mile radius of the Complete Streets improvements. Furthermore, the geoarchaeological review indicates that the portions of the proposed project located in the vicinity of the San Luis Rey River, Loma Alta Creek, and Buena Vista Lagoon are sensitive for the presence of prehistoric archaeological resources. As such, the Complete Streets improvements should be considered sensitive for the presence of archaeological resources. Given the sensitivity of the Complete Streets improvements for the presence of archaeological resources, recommendations for additional cultural resources survey, construction worker cultural resources sensitivity training, archaeological and Native American monitoring, and work stoppage and treatment measures to be implemented in the event of inadvertent discoveries of archaeological resources or human remains are provided in the *Summary and Recommendations* section at the close of this report. Also included are mitigation measures provided by the San Luis Rey Band of Mission Indians.

Of the 20 built environment resources located within or immediately adjacent to the Complete Streets improvements, 17 were relocated as a result of the survey. The buildings that could not be relocated are presumed to have been relocated or demolished since originally recorded. The San Luis Rey River Bridge is the only built environment resource located within the Complete Streets improvements. The San Luis Rey River Bridge is not eligible for listing in the National Register of Historic Places (NRHP), but has not been evaluated for inclusion in the CRHR or as a City Historical Site. The only proposed alteration to the bridge would be restriping to provide a Class II bicycle lane in both directions. Proposed project-level activities for the bridge do not include any ground disturbance or modification to the structure itself. As such, no physical or visual alterations to the bridge are proposed and the resource would not be significantly impacted by the proposed project. The remaining 16 relocated resources are located immediately adjacent to the Complete Streets improvements and the proposed project alterations to the Coast Highway corridor would not physically impact any of these built environment resources. Moreover, given that the improvements would not drastically alter the visual characteristics of the Coast Highway, and would not introduce any new visually intrusive elements, visual impacts to the built environment resources are not anticipated. As such, the built environment resources within the Complete Streets improvements would not be significantly impacted by the proposed project.

For the area covered by the Incentive District, a records search and Native American consultation were conducted. Further detailed review was not conducted in this area since specific development projects are not proposed at this time. As a result of the records search, eight built environment resources (216 South Tremont Street, 308 Missouri Avenue, 321 South Tremont Street, 327 South Tremont Street, 401 Seagaze Drive, 405 South Tremont Street, 510 Kelley Street, and 517 Michigan Avenue) were identified solely within the Incentive District. An

additional 11 built environment resources (123 Coast Highway, 133 Coast Highway, 201 Coast Highway, 202 Coast Highway, 217 Coast Highway, 232 Coast Highway, 301 Coast Highway, 309 Coast Highway, 402 Coast Highway, 524 Coast Highway, 600 Coast Highway, 631 Coast Highway, 1310 Coast Highway, and 2002 South Coast Highway) are located both within the Complete Streets improvements and Incentive District. Of the total 19 built resources within the Incentive District, one (133 Coast Highway) is eligible for the CRHR, and 18 have not been evaluated for the CRHR. To ensure that resources are not impacted or adversely affected by future projects carried out within the Incentive District, recommendations for field surveys and evaluation and treatment of resources, which may be required for future projects, are provided in the *Summary and Recommendations* section at the conclusion of this report.

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COAST HIGHWAY CORRIDOR STUDY PROJECT, OCEANSIDE, CALIFORNIA

Phase I Cultural Resources Assessment

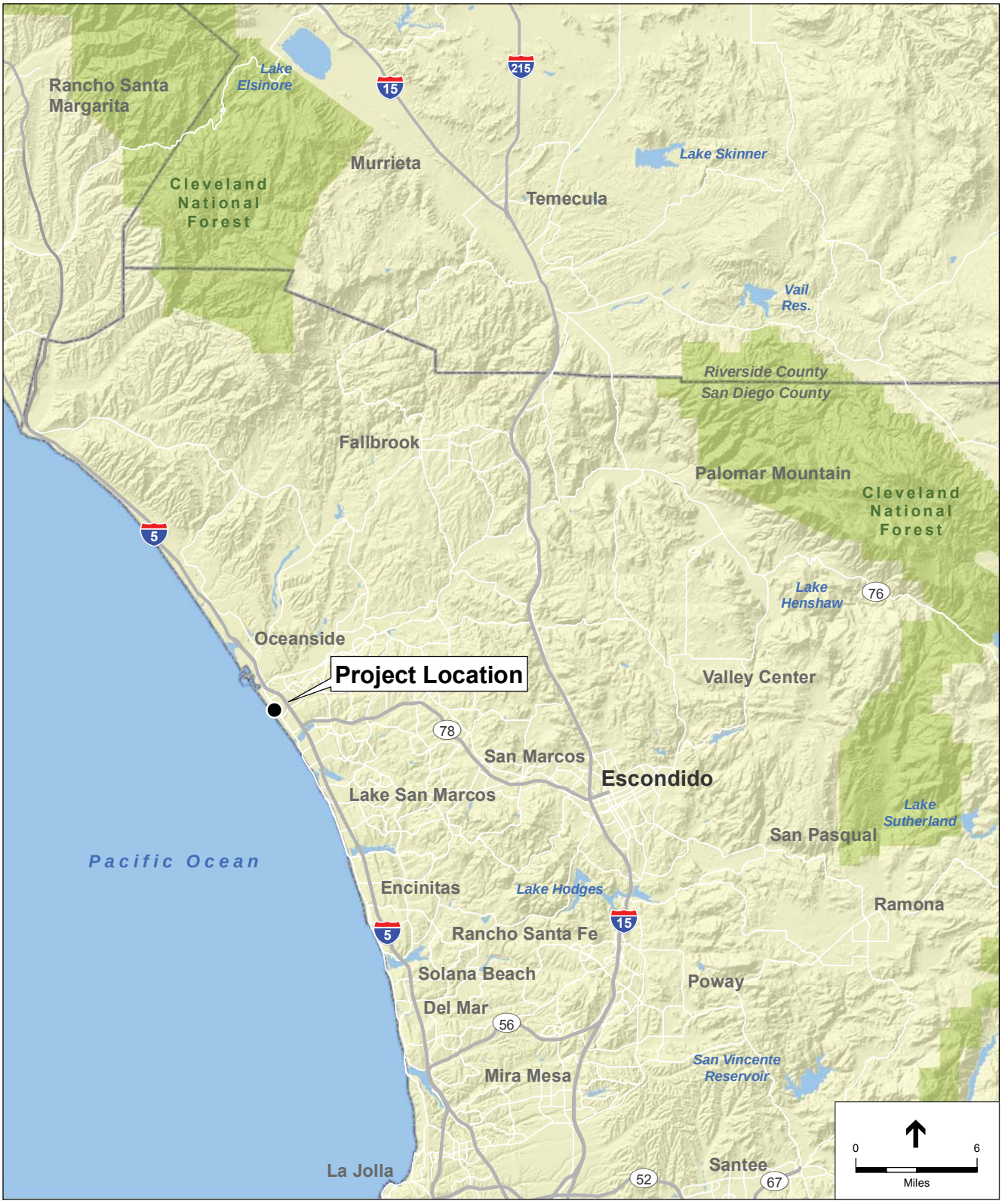
Introduction

ESA has been retained by the City to prepare an EIR for the proposed project pursuant to the requirements of the CEQA. The proposed project would modify an approximate 3.50-mile-long segment of the Coast Highway corridor that runs through the City, to encourage redevelopment and revitalization of the area. Proposed modifications include lane conversions, street improvements, intersection roundabouts, and increased parking and bicycle facilities, as well as an amendment to the Zoning Ordinance to create an Incentive District. The City is the lead agency responsible for compliance with CEQA.

This Phase I Cultural Resources Assessment has been prepared in compliance with CEQA, in support of the project's EIR, and includes the results of a records search conducted at the SCIC, a historic map and aerial photograph review, Native American consultation, a geoarchaeological assessment, and a reconnaissance-level survey of the Coast Highway corridor. ESA personnel involved in the preparation of this report include: Michael R. Bever, Ph.D., R.P.A., Principal Investigator; Michael Vader, B.A., report author and surveyor; Chris Lockwood, Ph.D., R.P.A., author of the geoarchaeological review; Vanessa Ortiz, M.A., R.P.A, report contributor; and Jason Nielsen, GIS specialist. Resumes of key personnel are included in **Appendix A**.

Project Location

The proposed project is located within the City in northern San Diego County, approximately 32 miles north of the City of San Diego and 70 miles south of Los Angeles (**Figure 1**). The proposed project encompasses the Coast Highway corridor from Harbor Drive in the north to approximately 550 feet south of Eaton Street on the south. Specifically, the proposed project is located within Sections 22, 23, 26, 35, and 36 of Township 11 South, Range 5 West on the Oceanside and San Luis Rey (CA) USGS 7.5-minute topographic quadrangles (**Figure 2**).

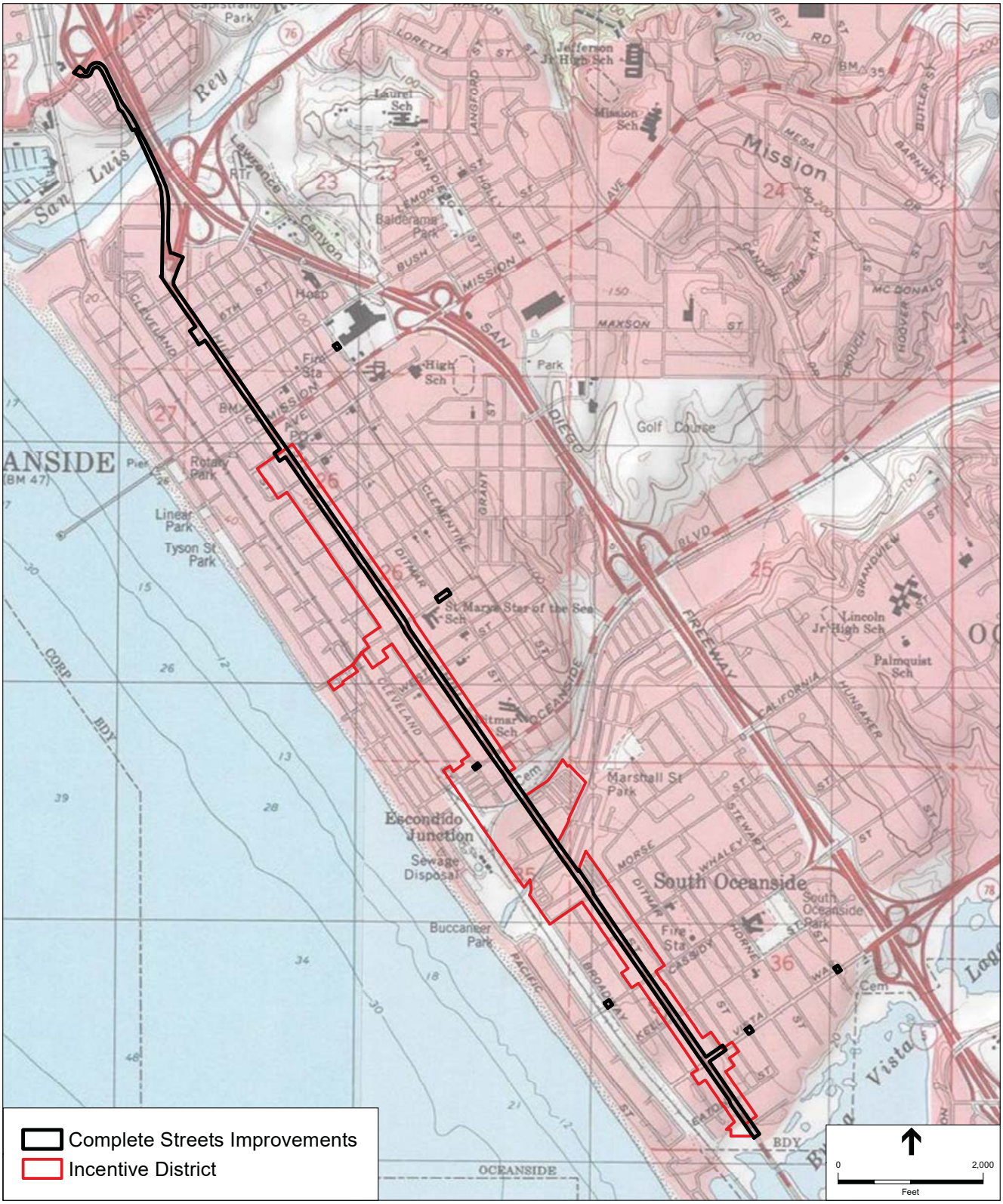


SOURCE: ESRI; SanGIS 2015

Coast Highway Corridor Study. 130217

Figure 1

Regional Location



TOPOQUAD: Oceanside and San Luis Rey USGS 7.5-minute Topo Quads

Coast Highway Corridor Study. 130217.00

Figure 2
Project Location

Project Description

The proposed project consists of two components, the Complete Streets improvements, analyzed at a project-level, and an Incentive District, analyzed programmatically. The Complete Streets improvements span approximately 3.5 miles from the northern terminus of Coast Highway at Harbor Drive to Eaton Street near the City's southern boundary and would include enhancements to the existing roadway infrastructure as well as bicycle, pedestrian, and transit facilities throughout the corridor. The Incentive District would extend in an irregular shape from Seagaze Drive to the north past Eaton Street to the south, and extend from Ditmar Street on the east to Pacific Street on the west. The Incentive District would provide optional regulations and standards that a developer or property owner may choose in lieu of the existing underlying zoning. If adopted, the Incentive District would be an optional zoning program that individual developers could choose to apply for new development or redevelopment within the Incentive District boundary. Implementation of the Incentive District would require amendments to the City's existing General Plan and Zoning Ordinance. It should be noted that when referring specifically to each project component, the terms "Complete Streets improvements" and "Incentive District" will be used to describe the individual areas while the term "project area" will be used when referring to the combined area of both project components (**Figure 3**).

As mentioned, the Complete Streets improvements and Incentive District are analyzed at the project and programmatic level, respectively. Due to the different levels of analysis for the Complete Streets improvements and the Incentive District, the methods used in this cultural resources assessment differ. The project-level analysis examines the Complete Streets improvements at a site-specific level pursuant to *CEQA Guidelines* Section 15161. The project-level analysis includes a records search conducted at the SCIC, a historic map and aerial photograph review, Native American consultation, a geoarchaeological review, and reconnaissance-level survey of the Coast Highway corridor. The programmatic analysis examines the Incentive District, which would provide optional regulations and standards which a developer or property owner may choose in lieu of the existing underlying zoning. If adopted, the Incentive District would be an optional zoning program that individual developers could choose to apply for new development or redevelopment within the Incentive District boundary. Since future development projects proposed to be developed under the Incentive District are not known at this time, the Incentive District is analyzed at a programmatic level. The programmatic analysis includes the SCIC records search and Native American consultation included in the project-level analysis, but does not include a pedestrian survey of the Incentive District.



SOURCE: City of Oceanside 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 3

Project Area and Vicinity

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Regulatory Framework

Numerous laws and regulations require state and local agencies to consider the effects a proposed project may have on cultural resources. These laws and regulations stipulate a process for compliance, define the responsibilities of the various agencies proposing the action, and prescribe the relationship among other involved agencies. CEQA and California Public Resources Code (PRC) 5024; and the CRHR; are the primary state laws governing and affecting preservation of cultural resources of national, state, regional, and local significance.

State

California Environmental Quality Act

CEQA is the principal statute governing environmental review of projects occurring in the State and is *codified at PRC Section 21000 et seq.* CEQA requires lead agencies to determine if a proposed project would have a significant effect on the environment, including significant effects on historical or archaeological resources.

Under CEQA (Section 21084.1), a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment. The CEQA Guidelines (Section 15064.5) recognize that a historical resource includes: (1) a resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR; (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); and (3) any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California by the lead agency, provided the lead agency's determination is supported by substantial evidence in light of the whole record. The fact that a resource does not meet the three criteria outlined above does not preclude the lead agency from determining that the resource may be a historical resource as defined in PRC Sections 5020.1(j) or 5024.1.

If a lead agency determines that an archaeological site is a historical resource, the provisions of Section 21084.1 of CEQA and Section 15064.5 of the CEQA Guidelines apply. If a project may cause a substantial adverse change (defined as physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired) in the significance of a historical resource, the lead agency must identify potentially feasible measures to mitigate these effects (CEQA Guidelines Sections 15064.5(b)(1), 15064.5(b)(4)).

If an archaeological site does not meet the criteria for a historical resource contained in the CEQA Guidelines, then the site may be treated in accordance with the provisions of Section 21083, which is a unique archaeological resource. As defined in Section 21083.2 of CEQA a "unique" archaeological resource is an archaeological artifact, object, or site, about which it can be clearly

demonstrated that without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information;
- Has a special and particular quality such as being the oldest of its type or the best available example of its type; or
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

If an archaeological site meets the criteria for a unique archaeological resource as defined in Section 21083.2, then the site is to be treated in accordance with the provisions of Section 21083.2, which state that if the lead agency determines that a project would have a significant effect on unique archaeological resources, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place (Section 21083.1(a)). If preservation in place is not feasible, mitigation measures shall be required.

The CEQA Guidelines note that if an archaeological resource is neither a unique archaeological nor a historical resource, the effects of the project on those resources shall not be considered a significant effect on the environment (CEQA Guidelines Section 15064.5(c)(4)).

Pursuant to CEQA Guidelines Section 15300.2(f), a categorical exemption shall not be used for a project which may cause a substantial adverse change in the significance of a historical resource. The significance of a historical resource is materially impaired when a project demolishes or materially alters in an adverse manner those physical characteristics that convey its historical significance (CEQA Guidelines Section 15064.5(b)(2)).

California Register of Historical Resources

The CRHR is "an authoritative listing and guide to be used by State and local agencies, private groups, and citizens in identifying the existing historical resources of the State and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC Section 5024.1[a]). The criteria for eligibility for the CRHR are based upon NRHP criteria (PRC Section 5024.1[b]). Certain resources are determined by the statute to be automatically included in the CRHR, including California properties formally determined eligible for, or listed in, the NRHP.

To be eligible for the CRHR, a resource must be significant at the local, state, and/or federal level under one or more of the following four criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

4. Has yielded, or may be likely to yield, information important in prehistory or history.

A resource eligible for the CRHR must meet one of the criteria of significance described above, and retain enough of its historic character or appearance (integrity) to be recognizable as a historical resource and to convey the reason for its significance. It is possible that a resource may not retain sufficient integrity to meet the criteria for listing in the NRHP, but it may still be eligible for listing in the CRHR.

Additionally, the CRHR consists of resources that are listed automatically and those that must be nominated through an application and public hearing process. The CRHR automatically includes the following:

- California properties listed on the NRHP and those formally Determined Eligible for the NRHP;
- California Registered Historical Landmarks from No. 770 onward; and
- Those California Points of Historical Interest that have been evaluated by the Office of Historic Preservation and have been recommended to the State Historical Commission for inclusion on the CRHR.

Other resources that may be nominated to the CRHR include:

- Historical resources with an NRHP code of 3 through 5 (those properties identified as eligible for listing in the NRHP, the CRHR, and/or a local jurisdiction register);
- Individual historical resources;
- Historical resources contributing to historic districts; and
- Historical resources designated or listed as local landmarks, or designated under any local ordinance, such as a historic preservation overlay zone.

California Health and Safety Code Section 7050.5

California Health and Safety Code Section 7050.5 requires that in the event human remains are discovered, the County Coroner be contacted to determine the nature of the remains. In the event the remains are determined to be Native American in origin, the Coroner is required to contact the California NAHC within 24 hours to relinquish jurisdiction.

California Public Resources Code Section 5097.98

California PRC Section 5097.98, as amended by Assembly Bill 2641, provides procedures in the event human remains of Native American origin are discovered during project implementation. PRC Section 5097.98 requires that no further disturbances occur in the immediate vicinity of the discovery, that the discovery is adequately protected according to generally accepted cultural and archaeological standards, and that further activities take into account the possibility of multiple burials. PRC Section 5097.98 further requires the NAHC, upon notification by a County Coroner, designate and notify a Most Likely Descendant (MLD) regarding the discovery of Native American human remains. Once the MLD has been granted access to the site by the landowner

and inspected the discovery, the MLD then has 48 hours to provide recommendations to the landowner for the treatment of the human remains and any associated grave goods.

In the event that no descendant is identified, or the descendant fails to make a recommendation for disposition, or if the land owner rejects the recommendation of the descendant, the landowner may, with appropriate dignity, reinter the remains and burial items on the property in a location that will not be subject to further disturbance.

Senate Bill 18

Senate Bill 18 (SB 18) (Statutes of 2004, Chapter 905), which went into effect January 1, 2005, requires local governments (city and county) to consult with Native American tribes before making certain planning decisions and to provide notice to tribes at certain key points in the planning process. The intent is to "provide California Native American tribes an opportunity to participate in local land use decisions at an early planning stage, for the purpose of protecting, or mitigating impacts to, cultural places" (Governor's Office of Planning and Research, 2005).

The purpose of involving tribes at these early planning stages is to allow consideration of cultural places in the context of broad local land use policy, before individual site-specific, project-level, land use designations are made by a local government. The consultation requirements of SB 18 apply to general plan or specific plan processes proposed on or after March 1, 2005.

According to the *Tribal Consultation Guidelines: Supplement to General Plan Guidelines* (Governor's Office of Planning and Research, 2005), the following are the contact and notification responsibilities of local governments:

- Prior to the adoption or any amendment of a general plan or specific plan, a local government must notify the appropriate tribes (on the contact list maintained by the NAHC) of the opportunity to conduct consultations for the purpose of preserving, or mitigating impacts to, cultural places located on land within the local government's jurisdiction that is affected by the proposed plan adoption or amendment. Tribes have 90 days from the date on which they receive notification to request consultation, unless a shorter timeframe has been agreed to by the tribe (Government Code Section 65352.3).
- Prior to the adoption or substantial amendment of a general plan or specific plan, a local government must refer the proposed action to those tribes that are on the NAHC contact list and have traditional lands located within the city or county's jurisdiction. The referral must allow a 45-day comment period (Government Code Section 65352). Notice must be sent regardless of whether prior consultation has taken place. Such notice does not initiate a new consultation process.
- Local government must send a notice of a public hearing, at least 10 days prior to the hearing, to tribes who have filed a written request for such notice (Government Code Section 65092).

Assembly Bill 52

Assembly Bill 52 (AB 52)(Chapter 532, Statutes of 2014) requires lead agencies to consider the effects of projects on tribal cultural resources and to conduct consultation with federally and non-federally recognized Native American Tribes early in the environmental planning process. AB 52 applies specifically to projects for which a Notice of Preparation (NOP) or a notice of Negative Declaration (ND) or Mitigated Negative Declaration (MND) will be filed on or after July 1, 2015.

The goal of AB 52 is to include California Tribes in determining whether a project may result in a significant impact to tribal cultural resources that may be undocumented or known only to the Tribe and its members. This bill specifies that a project that may cause a substantial adverse change in the significance of a tribal cultural resource (sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe) is a project that may have a significant effect on the environment. AB 52 defines tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe" that are either included or determined to be eligible for inclusion in the CRHR or included in a local register of historical resources (PRC Section 21074 (a)(1)).

AB 52 requires that prior to determining whether a ND, MND, or EIR is prepared for a project, the lead agency must consult with California Native American Tribes, defined as those identified on the contact list maintained by the NAHC, who are traditionally and culturally affiliated with the geographic area of the proposed project, and who have requested such consultation in writing. The following is what the scope of consultation may include according to PRC Section 21080.3.2(a):

- The type of environmental review necessary
- The significance of tribal cultural resources
- The significance of the project's impacts on the tribal cultural resources
- Project alternatives or the appropriate measures for preservation
- Recommended mitigation measures

AB 52 outlines the required procedures concerning consultation (PRC Section 21080.3.1(d) and (e)) including the initiation and conclusion of consultation. Consultation should be initiated by a lead agency within 14 days of determining that an application for a project is complete or that a decision by a public agency to undertake a project. The lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American Tribes that have requested notice. At the very least the notice should consist of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American Tribe has 30 days to request consultation pursuant to this section. The lead agency shall begin the consultation process within 30 days of receiving a California Native American Tribe's request for consultation. According to PRC Section 21080.3.2(b), consultation is considered concluded when either the parties agree to measures to mitigate or

avoid a significant effect, if a significant effect exists, on a tribal cultural resource, or a party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached.

Local

City of Oceanside

General Plan

The City's General Plan, Land Use Element (2002), contains the following cultural resources policies relevant to the proposed project:

Policy A: The City shall encourage open space land use designations and open space zoning or open space easements for the preservation of cultural resources.

Policy B: The City shall encourage the acquisition, restoration and/or maintenance of significant cultural resources by private organizations.

Policy C: Cultural resources that must remain in-situ to preserve their significance shall be preserved intact and interpretive signage and protection shall be provided by project developers.

Policy D: An archaeological survey report shall be prepared by a Society of Professional Archaeologists[1] (SOPA) certified archaeologist for a project proposed for grading or development if any of the following conditions are met:

1. The site is completely or largely in a natural state**;**
2. There are recorded sites on nearby properties;
3. The project site is near or overlooks a water body (creek, stream, lake, freshwater lagoon);
4. The project site includes large boulder and/or oak trees; or
5. The project site is located within 0.5-mile of Mission San Luis Rey.

Policy E: The presence of agriculture on a potential project site shall not preclude the requirement for an archaeological survey report if any of the above listed conditions are established.

Oceanside City Code Chapter 14A: Historical Preservation Ordinance

The City Code has established the following sections for the preservation of historical resources that are relevant to the proposed project:

[1] Note: the Society of Professional Archaeologists has been replaced by the Register of Archaeologists (RPA), which provides the same certification.

Section 14A.2. Policy and Purpose

(a) **Policy.** It is hereby declared as a matter of public policy that the recognition, preservation, enhancement, perpetuation and use of structures, landscape features, sites and areas within the City of Oceanside having historical, architectural, archeological, cultural or aesthetic significance is required in the interest of the economic prosperity, cultural enrichment and general welfare of the people.

(b) **Purpose**.

(1) Safeguard the heritage of the City of Oceanside by providing for the protection of historical sites and areas representing significant elements of its history;

(2) Encourage public knowledge, understanding, and appreciation of the City's past;

(3) Enhance the visual character of the City by encouraging and regulating the compatibility of architectural styles within historical areas reflecting significant architectural traditions;

(4) Foster civic and neighborhood pride and a sense of identity based on the recognition and use of historical areas and sites;

(5) Strengthen the economy of the City by protecting and enhancing the City's attractions to residents, tourists and visitors;

(6) Stabilize and improve property values and increase economic and financial benefits to the City and its inhabitants;

(7) Identify as early as possible and resolve conflicts between the preservation of historical areas and sites and alternative land uses; and

(8) Promote the private and public use of historical areas and sites for the education, prosperity and general welfare of the people (Ord. No. 82-41, Sections 1, 9-8-82).

Section 14A.6. Historical Area or Site Designation Criteria.

For the purposes of this chapter, a historical area or site may be designated as such by resolution of the City council pursuant to section 14A.7 if it meets the following criteria:

(a) It exemplifies or reflects special elements of the City's cultural, social, economic, political, aesthetic, engineering, or architectural history; or

(b) It is identified with persons or events significant in local, state, or national history; or

(c) It embodies distinctive characteristics of a style, type, period, or method of construction, or is a valuable example of the use of indigenous materials or craftsmanship; or

(d) It is representative of the notable work of a builder, designer, or architect; or

(e) It is found by the council to have significant characteristics which should come under the protection of this chapter (Ord. No. 82-14, Sections 1, 9-8-82).

Section 14A.7. Historical Area or Site Designation Procedures.

Historical areas or sites shall be established by the City Council in the following manner:

(a) Any person may request the designation of an improvement or landscape feature as a historical site or the designation of a historic area by submitting a written request for such designation to the commission. The commission or city council may also initiate such proceedings on their own motion.

(b) The commission shall conduct a study of the proposed designation and make a preliminary determination based on such documentation as it may require, as to its appropriateness for consideration. The commission shall forward a report containing its findings and determinations to the city council and the city clerk.

(c) Upon receipt of the commission's report, the city clerk shall schedule a public hearing and give notice as set forth in subsection (5) below for a proposed historical site or subsection (6) below for a proposed historical area. The public hearing shall be held within forty-five (45) days of receipt of the commission's report.

(d) A notice of the scheduled public hearing shall be forwarded to the building department by the city clerk and no building, alteration, demolition or removal permits for any improvement, building, structure or landscape feature within the proposed historical area or relative to a proposed historical site shall be issued while the public hearing or any appeal thereto is pending.

(e) In the case of a proposed historical site, notice of the date, place, time and purpose of the hearing shall be given by first class mail to the owners and occupants of all properties affected at least twenty (20) days prior to the date of the public hearing, using the name and address of such owners as shown on the latest equalized assessment rolls, and shall be advertised once in a daily newspaper of general circulation.

(f) In the case of a proposed historical area, notice of the date, place, time and purpose of the hearing shall be given by first class mail to the owners and occupants of all properties within the proposed area at least twenty (20) days prior to the date of the public hearing, using the name and address of such owners as shown on the latest equalized assessment rolls, and shall be advertised once in a daily newspaper of general circulation.

(g) At the conclusion of the public hearing on the proposed designation, the city council shall, by resolution, designate the area or site, in whole or in part, or the council may make findings regarding its rejection of the proposed designation.

(h) Failure to send any notice by mail to any property owner where the address of such owner is not on the latest equalized assessment roll shall not invalidate any proceedings in connection with the proposed designation.

(i) The time for designation should not exceed two (2) calendar months unless a greater period of time is required as may be determined by the council. The council shall consider, when considering an extension of time, any undue hardship which may result from such extension (Ord. No. 82-41, Sections 1, 9-8-82).

Setting

Environmental Setting

The project area is located within urbanized downtown Oceanside and is bounded to the north by the San Luis Rey River and to the south by Buena Vista Lagoon. Loma Alta Creek, a concrete channel, bisects the central portion of the project area. The project area consists of paved streets and bridges within areas dominated by commercial and residential development.

Prehistoric Setting

The chronology of coastal Southern California is typically divided into three general periods: the Early Holocene (11,000 to 8,000 before present [B.P.]), the Middle Holocene (8,000 to 4,000 B.P.), and the Late Holocene (4,000 B.P. to A.D. 1769). Within this general timeframe, the archaeology of Southern California is generally described in terms of cultural "complexes." A complex is a specific archaeological manifestation of a general mode of life, characterized archaeologically by particular technologies, artifacts, economic systems, patterns of trade, burial practices, and other aspects of culture.

Early Holocene (11,000 to 8,000 B.P.)

While it is not certain when humans first came to California, their presence in Southern California by about 11,000 B.P. has been well documented. At Daisy Cave, on San Miguel Island, cultural remains have been radiocarbon dated to between 11,100 and 10,950 years B.P. (Byrd and Raab 2007). On the mainland, radiocarbon evidence confirms occupation of the Orange County and San Diego County coast by about 9,000 B.P., primarily in lagoon and river valley locations (Gallegos 2002). During the Early Holocene, the climate of Southern California became warmer and more arid and the human population, residing mainly in coastal or inland desert areas, began exploiting a wider range of plant and animal resources (Horne and McDougall 2003).

The primary Early Holocene cultural complex in coastal Southern California was the San Dieguito Complex. The people of the San Dieguito Complex (about 10,000–8,000 B.P.) inhabited the chaparral zones of southwestern California, exploiting the plant and animal resources of these ecological zones (Moratto 1984; Warren 1967). Leaf-shaped and large-stemmed projectile points are typical of San Dieguito Complex material culture.

Middle Holocene (8,000 to 4,000 B.P.)

During the Middle Holocene, there is evidence for the processing of acorns for food and for the increased importance of hunting (Horne and McDougall 2003). The processing of plant foods increased (particularly acorns), a wider variety of animals were hunted, and trade with neighboring regions intensified (Horne and McDougall 2003). Major technological changes appeared as well, particularly with the advent of the bow and arrow, which largely replaced the use of the dart and atlatl.

The Middle Holocene La Jolla Complex (about 8,000–4,000 B.P.) is essentially a continuation of the San Dieguito Complex. La Jolla groups lived in chaparral zones or along the coast, often migrating between the two. Coastal settlement focused around the bays and estuaries of coastal Orange and San Diego counties. La Jolla peoples produced large, coarse stone tools, but also produced well-made projectile points and milling slabs. The La Jolla Complex represents a period of population growth and increasing social complexity, and it was also during this period that the first evidence of the grinding of seeds for flour appears, as indicated by the abundance of millingstones in the archaeological record (Horne and McDougall 2003).

Late Holocene (4,000 B.P. to A.D. 1769)

During the Late Holocene, native populations of Southern California were becoming less mobile and populations began to gather in small sedentary villages with satellite resource-gathering camps. Evidence indicates that the overexploitation of larger, high-ranked food resources may have led to a shift in subsistence towards a focus on acquiring greater amounts of smaller resources, such as shellfish and small-seeded plants (Byrd and Raab 2007). In coastal Southern California, conditions became drier and many lagoons were transformed into saltwater marshes. Because of this, populations abandoned mesa and ridge tops to settle nearer to permanent freshwater resources (Gallegos 2002). Although the intensity of trade had already been increasing, it reached its zenith during this period, with asphaltum (tar), seashells, and steatite being traded from Southern California to the Great Basin.

Ethnographic Setting

Luiseño

Native Americans living in the project area at the time of Spanish contact are now known as the Luiseño, after the Mission San Luis Rey to which many of them were relocated. The language of the Luiseño people has been identified as belonging to the Cupan group of the Takic subfamily, which is part of the larger Uto-Aztecan language family (Bean and Shipek 1978). Luiseño territory includes portions of northern San Diego, southern Orange, and Riverside Counties, and would have encompassed a diverse environment including lagoons and marshes, coastal areas, inland river valleys, foothills, and mountains. The neighbors of the Luiseño to the north and northwest were the Juaneño, Gabrieliño, and Serrano; to the east were the Cahuilla and Cupeño; and to the south were the Kumeyaay.

The Luiseño subsisted on small game, coastal marine resources, and a wide variety of plant foods such as grass seeds and acorns. Luiseño houses were conical thatched reed, brush, or bark structures. The Luiseño inhabited permanent villages centered around patrilineal clans, with each village headed by a chief, or *not* (Kroeber 1925; Sparkman 1908). Seasonal camps associated with villages were also used. Each village or clan had an associated territory and hunting, collecting, and fishing areas. Villages were typically located in proximity to a food or water source, or in defensive locations, often near valley bottoms, streams, sheltered coves or canyons, or coastal strands (Bean and Shipek 1978). It is estimated that there may have been around 50

Luiseño villages with a population of about 200 each at the time of the first Spanish contact (Bean and Shipek 1978).

Today, there are six federally recognized tribes in California who share Luiseño tribal affiliation, language, and culture, including the La Jolla Band of Luiseño Indians (La Jolla), Rincon Band of Luiseño Indians (Rincon), Pauma Yuima Band of Mission Indians (Pauma), Pechanga Band of Luiseño Indians (Pechanga), Pala Band of Mission Indians (Pala), and Soboba Band of Luiseño Indians (Soboba).

Kumeyaay

The greater San Diego area was inhabited by a group of people known generally as the Kumeyaay. The Kumeyaay are one of many local Native groups collectively referred to as the Diegueño, specifically representing populations occupying an area that encompassed roughly southern present-day San Diego County, southern Imperial County, and northern Baja California (Kroeber 1925). The Kumeyaay language belonged to the Yuman language family, Hokan stock (Luomala 1978). Subsistence strategy for the Kumeyaay involved small-game hunting and resource gathering, with a noted reliance upon marine resources near San Diego Bay and along the Pacific Coast. Inland Kumeyaay populations relied primarily upon the exploitation of small game animals including insects, fish, birds, dove, rabbits, and squirrels, as well as abundantly available vegetal resources such as many varieties of seeds, principally the acorn, cacti, and herbaceous plants. Studies indicate that the Kumeyaay divided their seasonal subsistence between the mountain and the desert ecological zones. With the seasons, the Kumeyaay moved in small bands from one productive area to another to ensure a near constant food supply (Luomala 1978).

In 1769, the Mission San Diego de Alcalá was founded and Kumeyaay were missionized and eventually moved onto reservations (Luomala 1978). Today, Kumeyaay tribal members within the United States are divided into 12 federally recognized bands: Barona, Campo, Ewiiaapaayp, Inaja-Cosmit, Jamul, La Posta, Manzanita, Mesa Grande, San Pasqual, Santa Ysabel, Sycuan, and Viejas. An additional San Diego County band, the Kwaaymii Laguna Band of Indians, is not currently federally recognized. Several more Kumeyaay communities are present in Mexico.

Historic Setting

The first European presence in present-day San Diego County came in 1542, when Juan Rodriguez Cabrillo led an expedition along the coast. Europeans did not return until 1769, when the expedition of Gaspar de Portola traveled overland from San Diego to San Francisco. In the late 18th century, the Spanish began establishing missions in California and forcibly relocating and converting native peoples (Horne and McDougall 2003). The nearest mission to the project area is Mission San Luis Rey de Francía (San Luis Rey), founded in 1798 by Father Fermín de Francisco Lasuén de Arasqueta.

Disease and hard labor took a toll on the native populations; by 1900, the Native Californian population had declined by as much as 95 percent (Chartkoff and Chartkoff 1984). In addition, native economies were disrupted, trade routes were interrupted, and native ways of life were significantly altered.

In 1821, Mexico, which included much of present-day California, became independent from Spain, and during the 1820s and 1830s the California missions were secularized. Mission property was supposed to have been held in trust for the Native Californians, but instead was handed over to civil administrators and then into private ownership. After secularization, many former Mission Indians were forced to leave the Missions and seek employment as laborers, ranch hands, or domestic servants (Horne and McDougall 2003).

In 1848, gold was discovered in California, leading to a huge influx of people from other parts of North America. In 1850, California became part of the United States of America. The opening of the Butterfield Overland Stage route in 1858 and later the California Southern Railroad line in 1882 greatly increased the number of people coming to Southern California.

City of Oceanside

In May 1841, Governor Alvarado of the Mexican territory of Alta California granted the Rancho Margarita and Las Flores to brothers Pio and Andreas Pico. The 133,441-acre land grant encompassed present-day Camp Pendleton Marine Corps Base located approximately 1.75 miles north of the project area. In 1864, to pay off his debts, Pio sold his share to his brother-in-law John Forster, an Englishman, for $14,000. In 1882, Forster died and the rancho was purchased by Richard O'Neill for $250,000 (City of Oceanside n.d.). In 1906, O'Neill sold half his interest in the rancho to James C. Flood, Jr. and the two formed the Santa Margarita Rancho Corporation, which held the property until 1942 when it was sold to the United States Navy (City of Oceanside n.d.).

In 1883, the California Southern Railway, a branch of the Santa Fe Railroad, was constructed through what is present day Oceanside. The railway linked San Diego to San Bernardino and opened the San Diego County coastline for development (City of Oceanside n.d.). That same year, Andrew Jackson Myers, a local storekeeper, applied for a Homestead Grant on the Oceanside Mesa and was allotted 160 acres making him the first occupant of what would soon become the City of Oceanside (Oceanside Chamber of Commerce 2015). Five years later on July 3, 1888, the city was incorporated with a population 1,000 (City of Oceanside n.d.). In the coming decade, Oceanside expanded at an exponential rate with the construction of three hotels, two drug-stores, two livery stables, two blacksmiths, a hardware store, a bakery, a harness shop, a lumber yard, a barber shop, a school, and six churches, as well as the establishment of a newspaper.

In 1915, a paved highway connecting San Diego and Los Angeles was constructed through Oceanside, spurring expansion of the city throughout the 1920s. Additional markets, theaters, and hotels were built in what is present-day downtown Oceanside and residential subdivisions sprung up on West Street and Schaeffer Street located approximately 0.25 mile northeast of the project area. From 1914 through the 1920s a number of Hollywood productions were filmed in the vicinity of Oceanside, and the city’s hotels and beaches became an attractive getaway for early movie stars (Oceanside Chamber of Commerce 2015).

In 1942, the United States Navy purchased the land held by the Santa Margarita Rancho and constructed the nation's largest Marine Corps Base, Camp Pendleton, to train troops for service

during World War II (City of Oceanside n.d.). The construction of Camp Pendleton triggered rapid population growth in the city as serviceman and their families moved into the region and the city's population increased from 4,652 in 1940 to 12,888 in 1950 (City of Oceanside n.d.). Today, Oceanside is the third-largest city in San Diego County with a population of 167,086 and is serviced by Interstate 5 (I-5) and SR-76.

Archival Research

SCIC Records Search

Methods

A records search for the proposed project was conducted on July 10, 2016, by staff at the CHRIS SCIC, housed at San Diego State University. The records search included a review of all recorded cultural resources within a 0.5-mile radius of the Complete Streets improvements and Incentive District, as well as a review of cultural resources reports on file. The results of the records search are attached as Confidential Appendix B.

Results

Previous Cultural Resources Investigations

The records search conducted by the SCIC indicates that 123 cultural resources studies have been conducted within a 0.5-mile radius of the Complete Streets improvements and Incentive District. One hundred percent of the 0.5-mile radius records search area has been included in previous surveys. Thirty-one of the 123 studies include the Complete Streets improvements and Incentive District (**Table 1**).

TABLE 1
PREVIOUS CULTURAL RESOURCES INVESTIGATIONS WITHIN THE PROJECT AREA

Author	Report # (SD-)	Title	Year
Arrington, Cindy	10551	*Cultural Resources Final Report of Monitoring and Findings for the Qwest Network Construction Project, State of California*	2006
Berg, John and Brian F. Byrd	14214	*2012 Condition Assessment, Site Monitoring, and Effect Treatment (CASMET) Study, MCB Camp Pendleton, San Diego County, California*	2013
Berryman, Stanley	11973	*Replace Existing Steel and Poly-Vinyl Chloride (PVC) Gas Lines With High Density Polyethylene (HDPE) Gas Lines in Various Areas of MCB Camp Pendleton*	2008
Byrd, Brian F. and Collin O'Neill	9361	*Archaeological Survey Report for the Phase I Archaeological Survey along Interstate 5 San Diego County, CA.*	2002
Caltrans	14615	*I-5 North Corridor Project Supplementals*	2013
Carrico, Richard and Paul Ezell	335	*An Archaeological Survey of Proposed New Alignment of Route 76 Near Oceanside, California*	1974
Carrico, Richard L. and R.L. Franklin	8469	*Cultural Resource Test Sampling for a Proposed Flood Control Project in the Lower San Luis Rey River Drainage, Oceanside, Ca*	1979
Carrillo, Charles	577	*Map for Highway Alternatives Study 11-SD-76 0.012.9 11821-159021*	1982

TABLE 1
PREVIOUS CULTURAL RESOURCES INVESTIGATIONS WITHIN THE PROJECT AREA

Author	Report # (SD-)	Title	Year
Caterino, David	9516	*The Cemeteries and Gravestones of San Diego County: An Archaeological Study*	2005
Cooley, Theodore G. and Richard L. Carrico	9470	*Cultural Resources Inventory Report for Four San Luis Rey Land Outfall Pipeline Route Alternatives, City of Oceanside, California*	2004
Daniel, James T., Megan Black, Tony Quach, and Mark S. Becker	14059	*Final Results of the Condition Assessment, Site Monitoring, and Effects Treatment Plan (CASMET) Marine Corps Base Camp Pendleton, San Diego County, California*	2011
Dominici, Deborah	11761	*Historic Resources Survey Report, I- Cal Trans 5 North Coast Widening Project*	2007
Dominici, Deborah	12762	*Historic Property Survey Report for the Interstate 5 North Coast Corridor Project*	2010
Franklin, Randy and Richard L. Carrico	1070	*A Preliminary Archaeological Reconnaissance for a Proposed Flood Control Project in the Lower San Luis Rey River Drainage*	1978
Gallegos, Dennis R. and Sinead Ni Ghabhlain	4175	*Cultural Resource Evaluation Report for the Oceanside-Escondido Bikeway Project, San Marcos, California*	1999
Guerrero, Monica and Dennis R. Gallegos	12039	*Cultural Resources Monitoring Report for the North County Transit District (NCTD) Sprinter Rail Project Oceanside to Escondido, California*	2007
Hale, Micah J. and Mark S. Becker	11836	*An Archaeological Survey of Selected Areas for the Repair of 24 Access Roads to Training Ranges, Marine Corps Base Camp Pendleton, San Diego County, California*	2007
Laylander, Don and Linda Akyuz	11783	*Archaeological Survey for the Caltrans I-5 North Coast Corridor Project Biological Mitigation Parcels, San Diego County, California*	2008
Loftus, Shannon	14667	*Cultural Resource Records Search and Site Survey A.T.&T. Site SD0485 Adventure 16 2002 South Coast Highway Oceanside, San Diego County, California 92106*	2012
Ni Ghabhlain, Sinead	14069	*Cultural and Historical Resource Study for the City of Oceanside General Plan-Circulation Element Update Program Environmental Impact Report (PEIR)*	2011
Ni Ghalbhlain, Sinead and Drew Pallette	12422	*A Cultural Resources Inventory for the Route Realignment of the Proposed PF. Net/A.T.&T. Fiber Optics Conduit Oceanside to San Diego, California*	2001
Pettus, Roy E.	1269	*A Cultural Survey of Portions of the Las Chollas, South Las Chollas, Los Coches Forester, and Loma Alta Stream Basins in San Diego County, California*	1979
Recon	4973	*Final Master Environmental Impact Report for Oceanside Redevelopment*	1979
Reddy, Seetha N.	11460	*A Programmatic Approach for National Register Eligibility Determinations of Prehistoric Sites Within the Southern Coast Archaeological Region, California*	2007
Rosen, Martin	6636	*Historic Property Survey- Loma Alta Creek Channel*	1997
Schroth, Adella, Roxana Phillips, and Dennis Gallegos	3047	*Cultural Resource Inventory of the Santa Margarita River Valley, Camp Pendleton*	1996
Stringer-Bowsher, Sarah and Dan Killoren	14058	*Historic Context Study for Marine Corps Base Camp Pendleton San Diego, California*	2013
U.S. Department of the Navy	10496	*Final Results of the Condition Assessment, Site Monitoring, and Effects Treatment Program*	2006
Wade, Sue A. and Susan M. Hector	1677	*A Cultural Resource Survey of the Loma Alta Creek Improvement Plan Area*	1989

TABLE 1
PREVIOUS CULTURAL RESOURCES INVESTIGATIONS WITHIN THE PROJECT AREA

Author	Report # (SD-)	Title	Year
Wahoff, Tanya and Andrew L. York	9019	*Construction Monitoring Program for the Sewage Effluent Compliance Project Oceanside Outfall Alternative Marine Corps Base, Camp Pendleton and City of Oceanside, San Diego County, California*	2003
Westec Services Inc. and R.L. Franklin	7657	*Cultural Resource Test Sampling Program for a Proposed Flood Control Project in the Lower San Luis Rey River Drainage, Oceanside, Ca*	1979

Previously Recorded Cultural Resources

Archaeological Resources

The SCIC records search indicates that a total of 33 archaeological resources have been previously recorded within 0.5 mile of the Complete Streets improvements and Incentive District (**Table 2**). Of the 33 previously recorded archaeological resources, 19 (CA-SDI-626, -627, -628, -8455, -12600, -13211, -14058, -114059, 15870, -17672, -18348, -19441, -19944, -19946, -19947, 19948, -20692, -21274, and -33331) are prehistoric archaeological sites, six (CA-SDI-14145, -17245, -17796, -17907, -20845, and -21704) are historic-period archaeological sites, three (P-37-13212, -13212, and -21274) are multicomponent archaeological sites, and six (P-37-18810, -18811, -18812, -18813, -33869, and -33873) are prehistoric isolates.

Of the 33 previously documented archaeological resources, two (CA-SDI-14058 and -15870) are located solely within or immediately adjacent to (within 100 feet of) the Complete Streets improvements, and three (CA-SDI-14059 and -17796, and P-36-033869) are located solely within or immediately adjacent to the Incentive District. None has been evaluated for listing in the CRHR. The following section provides detailed descriptions of the archaeological resources located within the Complete Streets improvements and Incentive District, respectively.

TABLE 2
PREVIOUSLY RECORDED ARCHAEOLOGICAL RESOURCES WITHIN 0.25 MILE OF THE PROJECT AREA

Primary # (P-37-)	Trinomial (CA-SDI-)	Description	Date(s) Recorded	Distance from Project Area
000626	626	Prehistoric archaeological site: campsite	1972; 2014	0.35 mile
000627	627	Prehistoric archaeological site: campsite	1958	0.35 mile
000628	628	Prehistoric archaeological site: shell midden	1994; 2003	0.53 mile
008455	845	Prehistoric archaeological site: shell scatter	1981; 2014	0.47 mile
012600	12600	Prehistoric archaeological site: lithic scatter	1992	0.19 mile
013211	13211	Prehistoric archaeological site: shell scatter	1993	0.17 mile
013212	13212	Multicomponent archaeological site: shell scatter and historic-period refuse scatter	1993	0.13 mile
014266*	14058	Prehistoric archaeological site: shell scatter	1994; 2001	Within Complete Streets improvements

TABLE 2
PREVIOUSLY RECORDED ARCHAEOLOGICAL RESOURCES WITHIN 0.25 MILE OF THE PROJECT AREA

Primary # (P-37-)	Trinomial (CA-SDI-)	Description	Date(s) Recorded	Distance from Project Area
014277**	14059	Prehistoric archaeological site: shell scatter	1994	33 feet from Incentive District
014369	14145	Historic-period archaeological site: refuse scatter	1995	0.47 mile
018810	-	Prehistoric isolate: shell	2000	0.50 mile
018811	-	Prehistoric isolate: shell	2000	0.50 mile
018812	-	Prehistoric isolate: shell	2000	0.29 mile
018813	-	Prehistoric isolate: shell	2000	0.26 mile
019165*	15870	Prehistoric archaeological site: shell scatter	2001	100 feet from Complete Streets improvements
025937	17245	Historic-period archaeological site: refuse scatter	Brian F. Smith Associates, 2004	0.18 mile
027036	17672	Prehistoric archaeological site: shell midden	ASM Affiliates, 2005	0.39 mile
027207**	17796	Multicomponent archaeological site: prehistoric shell midden; historic-period railroad maintenance yard and associated refuse	2006	Within Incentive District
027452	17907	Historic-period cemetery	2006	265 feet
028351	18348	Prehistoric archaeological site: shell scatter	2007	265 feet
030591	19441	Prehistoric archaeological site: shell and lithic scatter	2009	0.19 mile
031408	19944	Prehistoric archaeological site: shell scatter	2010	0.45 mile
031410	19946	Prehistoric archaeological site: shell scatter	2010	0.38 mile
031411	19947	Prehistoric archaeological site: shell scatter	2010	0.33 mile
031412	19948	Prehistoric archaeological site: shell scatter	2010	0.29 mile
032654	20692	Prehistoric archaeological site: shell scatter	2012; 2014	0.43 mile
033105	20845	Historic-period archaeological site: refuse scatter	2013	0.19 mile
033331	-	Prehistoric isolate: mano	2013	0.10 mile
033869**	-	Prehistoric isolate: mano	2014	65 feet from Incentive District
033873	-	Prehistoric isolate: flake	2014	0.28 mile
033874	21274	Multicomponent archaeological site: prehistoric shell midden; historic-period railroad grade	2014	0.29 mile
033928	21313	Prehistoric archaeological site: shell scatter	2014	0.35 mile
034887	21704	Historic-period archaeological site: refuse scatter	2015	0.44 mile

TABLE 2
PREVIOUSLY RECORDED ARCHAEOLOGICAL RESOURCES WITHIN 0.25 MILE OF THE PROJECT AREA

Primary # (P-37-)	Trinomial (CA-SDI-)	Description	Date(s) Recorded	Distance from Project Area

*Indicates archaeological resource within or immediately adjacent to Complete Streets improvements
**Indicates archaeological resource within or immediately adjacent to Incentive District

Archaeological Resource Descriptions

Resource CA-SDI-14058: This resource is a prehistoric archaeological site documented in 1994 as a shell scatter located on a highly disturbed terrace overlooking the San Luis Rey River (Pigniolo and Beck 1994a). Shell fragments consisting of *Donax sp.,* as well as fire affected rock were identified in cut banks and rodent burrow spoils, indicating that the site contains a subsurface component (Pigniolo and Beck 1994a). The mapped location of the site was revisited in 2001 and the southern portion was found to have been partially destroyed by improvements to Riverside Road and the construction of apartment buildings (Pallette 2001). No artifacts or features were identified as a result of the 2001 site visit. Resource CA-SDI-14058 is located solely within the Complete Streets improvements and has not previously evaluated for inclusion in the NRHP, CRHR, or as a Historical Site under the City's Historical Ordinance (City Historical Site).

Resource CA-SDI-15870: This resource is a prehistoric archaeological site documented in 2001 as a shell scatter located on tidal flats of the San Luis Rey River (Robbins-Wade 2001). Shell species identified within the site include *Chione sp*., *Donax sp.*, and *Ostrea sp.*; however, no associated artifacts or features were identified (Robbins-Wade 2001). The mapped location of the site is within the San Luis Rey River. Resource CA-SDI-15870 is located solely within the Complete Streets improvements and has not been previously evaluated for inclusion in the NRHP, CRHR, or as a City Historical Site.

Resource CA-SDI-14059: This resource is a prehistoric archaeological site documented in 1994 as a shell scatter located near Tremont and Eucalyptus streets, (Pigniolo and Beck 1994b). Observed shell species include *Donax sp.*, *Chione sp.*, and *Argopectin sp.*, and two pieces of fire affected rock were noted (Pigniolo and Beck 1994b). Resource CA-SDI-14059 is located within 20 feet of the Incentive District. The resource is located immediately adjacent to the Incentive District and has not been previously evaluated for inclusion in the NRHP, CRHR, or as a City Historical Site.

Resource CA-SDI-17796: This resource is a historic-period archaeological site consisting of the former Atchison Topeka and Santa Fe Railroad maintenance yard which was active from the early 1900s through the 1980s. The resource was discovered during monitoring for the construction of the Oceanside Transit Center parking garage and was described as consisting of numerous refuse deposits, cement foundations, rail lines, pipelines, and an engine maintenance pit (McGinnis and Treinen 2005). The resource is located within the Incentive District. Resource

CA-SDI-17796 is located solely within the Incentive District and has not been previously evaluated for inclusion in the NRHP, CRHR, or as a City Historical Site.

Resource P-36-033869: This resource consists of a multicomponent archaeological site consisting of a sparse prehistoric and historic-period artifact scatter. Prehistoric artifacts noted include one chert flake, one mano, as well as a number of *Chione sp.*, *Pectin sp.*, and *Donax sp.* shell fragments (Davison and Castaneda 2014). Historic-period artifacts noted include a porcelain ceramic fragment, as well as concrete and asphalt fragments (Davison and Castaneda 2014). The artifacts were documented within a secondary deposit of imported sand fill and do not retain their original provenience (Davison and Castaneda 2014). Resource P-36-033869 is located immediately adjacent to the Incentive District and has not been previously evaluated for inclusion in the NRHP, CRHR, or as a City Historical Site.

Built Environment Resources

The SCIC records search indicates that 259 historic-period built environment resources have been previously recorded within 0.5 mile of the Complete Streets improvements and Incentive District. Of these 259 resources, 27 are located within or immediately adjacent (within 100 feet) to the Complete Streets improvements and Incentive District (**Table 3**). Of these 27 resources, 19 are located immediately adjacent to the Complete Streets improvements and eight are located solely within or immediately adjacent to the Incentive District. Of the 19 built environment resources located within the Complete Streets improvements, 11 are also located within the Incentive District. One additional resource, the San Luis Rey River Bridge (Bridge# CA 57 C-322), is not on file at the SCIC, but was identified within the Complete Streets improvements upon review of the Caltrans historic bridge inventory.

TABLE 3
HISTORIC-PERIOD BUILT ENVIRONMENT RESOURCES WITHIN 100 FEET OF THE PROJECT AREA

Primary # (P-37-)	Address	Other Identifier	Description	Within/Adjacent to Complete Streets Improvements	Within/Adjacent to Incentive District	NRHP/CRHR/City Historical Site Eligibility
035464	1151 South Coast Highway		Goodyear Express Tire Building	X	X	Ineligible for NRHP/CRHR/City Historical Site
-	123 Coast Highway	-	Craftsman-style single-family residence constructed in 1908	X	X	Ineligible for NRHP; City Historical Site; not evaluated for CRHR
-	133 Coast Highway	-	Keisker Hotel Building constructed in 1927	X	X	Eligible for NRHP and CRHR
-	201 Coast Highway	-	First National Bank of Oceanside Building constructed in 1925	X	-	Ineligible for listing in the NRHP; City Historical Site; not evaluated for CRHR
-	202 Coast Highway	-	Bank of Italy Building constructed in 1925	X	-	Ineligible for listing in the NRHP; eligible as a City Historical Site; not evaluated for CRHR

TABLE 3
HISTORIC-PERIOD BUILT ENVIRONMENT RESOURCES WITHIN 100 FEET OF THE PROJECT AREA

Primary # (P-37-)	Address	Other Identifier	Description	Within/Adjacent to Complete Streets Improvements	Within/Adjacent to Incentive District	NRHP/CRHR/City Historical Site Eligibility
-	216 South Tremont Street	-	Single-family residence constructed in 1908	-	X	Ineligible for listing in the NRHP; eligible as a City Historical Site; not evaluated for CRHR.
-	217 Coast Highway	-	Theater constructed in 1936	X	-	Not evaluated
-	232 Coast Highway	-	Commercial building constructed in 1929	X	X	Ineligible for NRHP and City Historical Site
-	301 Coast Highway	-	B.A. and Marian Mason Building constructed in 1932	X	X	Ineligible for NRHP and City Historical Site; not evaluated for CRHR
-	308 Missouri Avenue	-	Railroad trestles and culverts	-	X	Not evaluated
-	309 Coast Highway	-	D.G. Harrington Building constructed in 1908	X	X	Ineligible for NRHP and City Historical Site; not evaluated for CRHR
-	321 South Tremont Street	-	Railroad trestles and culverts	-	X	Not evaluated
-	327 South Tremont Street	-	Railroad trestles and culverts	-	X	Not evaluated
-	401 Seagaze Drive	-	Blade Tribune Building constructed in 1936	-	X	Ineligible for NRHP; City Historical Site; not evaluated for CRHR
-	402 Coast Highway	-	Star Theater constructed in 1956	X	-	Ineligible for listing in NRHP; City Historical Site; not evaluated for CRHR
-	405 South Tremont Street	-	California Bungalow-style single-family residence constructed in 1926	-	X	Ineligible for listing in NRHP; City Historical Site; not evaluated for CRHR
-	501 Mission Avenue	-	J.E. Jones Hardware Building constructed in 1912	X	-	Ineligible for NRHP; not evaluated for CRHR or as a City Historical Site
-	505 Mission Avenue	-	J.C. Penny Company Building constructed in 1924	X	-	Ineligible for listing in NRHP; City Historical Site; not evaluated for CRHR
-	510 Kelley Street	-	Apartment building constructed in 1930	-	X	Ineligible for NRHP and as a City Historical Site; not evaluated for CRHR
-	510 Sportfisher Way	-	Victorian-style single-family residence constructed in 1891	X	-	Ineligible for listing in NRHP; City Historical Site; not evaluated for CRHR

TABLE 3
HISTORIC-PERIOD BUILT ENVIRONMENT RESOURCES WITHIN 100 FEET OF THE PROJECT AREA

Primary # (P-37-)	Address	Other Identifier	Description	Within/Adjacent to Complete Streets Improvements	Within/Adjacent to Incentive District	NRHP/CRHR/City Historical Site Eligibility
-	517 Michigan Avenue	-	Ancillary structure constructed in 1890	-	X	Ineligible for NRHP and as a City Historical Site; not evaluated for CRHR
-	524 Coast Highway	-	Victorian-style single-family residence (Weitzel Residence) constructed in 1888	X	X	Ineligible for listing in NRHP; City Historical Site; not evaluated for CRHR
-	600 Coast Highway	-	Landscape feature consisting of palm trees	X	X	Ineligible for NRHP and as a City Historical Site; not evaluated for CRHR
-	631 Coast Highway	-	Commercial building constructed in 1928	X	X	Ineligible for NRHP and as a City Historical Site; not evaluated for CRHR
-	1310 Coast Highway	-	I.O.O.F. Cemetery	X	X	Ineligible for NRHP; not evaluated for CRHR or as a City Historical Site
-	2002 South Coast Highway	-	Commercial building constructed in 1947	X	X	Not evaluated
-	Pier View Way	-	Landscape feature consisting of the Melchoir Pieper Gardens	X	-	Not evaluated
-	-	San Luis Rey River Bridge*	Steel-framed bridge constructed in 1929	X	-	Ineligible for listing in NRHP; not evaluated for CRHR or as a City Historical Site

*Indicates resource is not on file at SCIC

Of the 28 historic-period built environment resources located within or immediately adjacent to the Complete Streets improvements and Incentive District:

- One has been recommended eligible for listing in the NRHP and is thus eligible for listing in the CRHR (133 Coast Highway),
- Seven are listed as City Historical Sites (123 Coast Highway, 201 Coast Highway, 402 Coast Highway, 405 South Tremont Street, 505 Mission Avenue, 510 Sportfisher Way, and 524 Coast Highway),
- Two are eligible for listing as City Historical Sites (202 Coast Highway and 216 South Tremont Street),
- Eight have been determined ineligible for listing as City Historical Sites (232 Coast Highway, 301 Coast Highway, 309 Coast Highway, 510 Kelley Street, 517 Michigan Avenue, 600 Coast Highway, 631 Coast Highway, and 1151 South Coast Highway), and

- Ten have not been evaluated for listing in either the CRHR or as a City Historical Site (217 Coast Highway, 308 Missouri Avenue, 321 South Tremont Street, 327 South Tremont Street, 401 Seagaze Drive [P-37-035464], 501 Mission Avenue, 1310 Coast Highway, 2002 South Coast Highway, Pier View Way, and the San Luis Rey River Bridge).

None of the resources is currently listed in the NRHP or the CRHR.

Built Environment Resource Descriptions

Resource P-37-035464: This resource consists of the Goodyear Tire Express building constructed in 1947. It is located on the northwest side of the intersection of Oceanside Boulevard and the Coast Highway. Resource P-37-035464 has been recommended ineligible for listing in the NRHP and CRHR, nor does it qualify as a City Historical Site (Bechtel and Tibbet 2014). The resource is located immediately adjacent to the Complete Streets improvements and within the Incentive District.

123 Coast Highway: This resource consists of a Craftsman-style single-family residence constructed in 1908. The resource has been determined ineligible for listing in the NRHP, but is a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements and within the Incentive District.

133 Coast Highway: This resource consists of the Keisker Hotel Building, also known as the Dolphin Hotel, constructed in 1927. The resource has been determined eligible for listing in the NRHP and is thus automatically eligible for listing in the CRHR (SCIC 2016). The resource is located immediately adjacent to the Complete Streets improvements and within the Incentive District.

201 Coast Highway: This resource consists of the First National Bank of Oceanside Building constructed in 1926. The resource has been determined ineligible for listing in the NRHP but is a City Historical Site (SCIC 2016). This resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements.

202 Coast Highway: This resource consists of the Bank of Italy Building constructed in 1927. The resource has been determined ineligible for listing in the NRHP, but is eligible as a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements.

217 Coast Highway: This resource consists of a theater constructed in 1936. The resource has not been previously evaluated for inclusion in the NRHP, CRHR, or as a City Historical Site (SCIC 2016). The resource is located immediately adjacent to the Complete Streets improvements.

232 Coast Highway: This resource consists of the R.J. Meyers Building, a commercial building constructed in 1929. The resource has been determined ineligible for listing in the NRHP and does not qualify as a City Historical Site (SCIC 2016). The resource has not been evaluated for

inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements and within the Incentive District.

301 Coast Highway: This resource consists of the B.A. and Marian Mason Building, a commercial building constructed in 1932. The resource has been determined ineligible for listing in the NRHP and does not qualify as a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements and within the Incentive District.

309 Coast Highway: This resource consists of the D.G. Harrington Property, a single-family residence constructed in 1908. The resource has been determined ineligible for listing in the NRHP and does not qualify as a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements and within the Incentive District.

402 Coast Highway: This resource consists of the Star Theater constructed in 1956. The resource has been determined ineligible for listing in the NRHP, but is a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements.

501 Mission Avenue: This resource consists of the J.E. Jones Hardware Store Building, a commercial building constructed in 1906. The resource has been determined ineligible for listing in the NRHP, but has not been evaluated for inclusion in the CRHR or as a City Historical Site (SCIC 2016). The resource is located immediately adjacent to the Complete Streets improvements.

505 Mission Avenue: This resource consists of the J.C. Penny Company Building, a commercial building constructed in 1924. The resource has been determined ineligible for listing in the NRHP, but is a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements.

510 Sportfisher Way: This resource consists of the Samuel Hunting Residence, a Victorian-style single-family residence constructed in 1890. The resource has been determined ineligible for listing in the NRHP but is a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements.

524 Coast Highway: This resource consists of the Wietzel Residence, a Victorian-style single-family residence constructed in 1888. The resource has been determined ineligible for listing in the NRHP but is a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements and within the Incentive District.

600 Coast Highway: This resource is a landscape feature that consists of palm trees lining both sides of the 600 block of Coast Highway. The resource has been determined ineligible for listing

in the NRHP and does not qualify as a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements and within the Incentive District.

631 Coast Highway: This resource consists of a commercial building constructed in 1926. The resource has been determined ineligible for listing in the NRHP and does not qualify as a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements and within the Incentive District.

1310 Coast Highway: This resource consists of the I.O.O.F Cemetery, which has been in use since 1895. The resource has been determined ineligible for listing in the NRHP but has not been evaluated for inclusion in the CRHR or as a City Historical Site (SCIC 2016). The resource is located immediately adjacent to the Complete Streets improvements and Incentive District.

2002 South Coast Highway: This resource consists of a commercial building constructed in 1947. The resource has not been evaluated for inclusion in the NRHP, CRHR, or as a City Historical Site (SCIC 2016). The resource is located immediately adjacent to the Complete Streets improvements and within the Incentive District.

Pier View Way: This resource is a landscape feature consisting of the Melchoir Pieper Gardens which were active between 1888 and the mid-20th century. The resource has been determined ineligible for listing in the NRHP and does not qualify as a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Complete Streets improvements.

San Luis Rey River Bridge (CA 57 C-322): This resource consists of a steel-framed, Warren deck truss bridge built by C.T. Gutleben in 1929 (bridgehunter.com, 2016). The resource has been determined ineligible for listing in the NRHP but has not been evaluated for inclusion in the CRHR or as a City Historical Site (Caltrans 2016). The resource is located within the Complete Streets improvements south of the intersection of Monterey Drive and Coast Highway.

216 South Tremont Street: This resource is a single-family residence, known as the C.B. Bishop Residence, constructed in 1908. The resource has been determined ineligible for listing in the NRHP but is a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. This resource is located within the Incentive District.

308 Missouri Avenue, 321 South Tremont Street, and 327 South Tremont Street: These three resources consist of railroad culverts and trestles associated with the Atchison Topeka and Santa Fe Railroad. These resources have not been previously evaluated for inclusion in the NRHP, CRHR, or as City Historical sites (SCIC 2016). These resources are located within the Incentive District.

401 Seagaze Drive: This resource consists of the Blade-Tribune Building, an Art Deco-style building constructed in 1936. The resource is ineligible for the NRHP, but has not been evaluated

for inclusion in the CRHR or as a City Historical Site (SCIC 2016). The resource is located within the Incentive District.

405 South Tremont Street: This resource is a California Bungalow-style single-family residence constructed in 1926. The resource has been determined ineligible for the NRHP but is a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Incentive District.

510 Kelley Street: This resource is an apartment building constructed in 1930. The resource has been determined ineligible for listing in the NRHP and does not qualify as a City Historical Resource (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Incentive District.

517 Michigan Avenue: This resource is an ancillary structure constructed in 1890. The resource has been determined ineligible for the NRHP and does not qualify as a City Historical Site (SCIC 2016). The resource has not been evaluated for inclusion in the CRHR. The resource is located immediately adjacent to the Incentive District.

Historical Map and Aerial Review

Historic maps and aerial photographs were examined to provide historical information about the project area and to contribute to an assessment of the project area's archaeological sensitivity. Available maps include: the 1870 U.S. Surveyor General's survey plat of Township 11 South, Range 5 West; the 1893 and 1898 Oceanside 15-minute topographic quadrangles; the 1901 San Luis Rey 30-minute topographic quadrangle; and the 1948 and 1968 San Luis Rey 7.5-minute topographic quadrangles. Historic aerial photographs of the project area from 1938, 1947, 1953, 1964, 1967, 1980, 2005, and 2012 were also examined (historicaerials.com 2016).

The available historic maps and aerial photographs indicate that the central portion of the project area has largely been used for residential and commercial development associated with the City since the late 19th century, with the northern and southern portions being devoted to agricultural activities. However, by the 1960s, residential development expanded to include the entire length of the project area. The 1870 U.S. Surveyor General's survey plat map shows Rancho Santa Margarita and Los Flores approximately 1 mile north of the project area. The plat map does not indicate any development associated with the City. The 1893 and 1898 Oceanside 15-minute topographic maps, as well as the 1901 San Luis Rey 30-minute topographic map, show the project area as bisecting Oceanside and South Oceanside. The maps show a grid of northeast-southwest and northwest-southeast oriented streets with a number of structures within the project area. A northwest-southeast trending road, which corresponds to present day Coast Highway, traverses the entire project area. The northwest-southeast oriented Southern California Railroad right-of-way is indicated parallel to the road immediately to the west.

The 1948 and 1968 San Luis Rey 7.5-minute topographic maps show that the City of Oceanside had expanded significantly since the early 20th century. The 1948 topographic map shows a large number of structures lining the grid of streets indicated in the previous maps. The northwest-southeast oriented Highway 101, which corresponds to present-day Coast Highway, is identified.

The 1968 topographic map shows that the town center of Oceanside has expanded to entirely fill the area from the northern tip of the project area to the southern tip, encompassing the entirety of the Coast Highway corridor between the San Luis Rey River bed to the north and the Buena Vista Lagoon to the south.

The historic aerial photographs largely reflect what is presented in the topographic maps. The 1938 historic aerial photograph shows that residential and commercial development associated with the City bounded a portion of Coast Highway between the San Luis Rey River in the north and Loma Alta Creek – roughly the central portion of the project area. The remaining northern and southern portions of the project area were dominated by agricultural fields. The 1947 aerial photograph shows a moderate degree of residential and commercial expansion bounding the Coast Highway corridor south of Loma Alta Creek. However, a number of agricultural fields are still present on the periphery of the residential and commercial areas. The 1953 aerial photograph shows that the entire project area has been developed, and that very few agricultural fields are located in the vicinity. The photograph also depicts the presences of I-5 located approximately 0.68 mile east of the project area. The 1967 aerial photograph shows an even greater density of development bounding the project area. The 1980 aerial photograph shows that Loma Alta Creek, which bisects the central portion of the project area, has been channelized. The 1980, 1994, and 2010 aerial photographs depict the current configuration of the project area and immediate vicinity, including the complete build out of commercial and residential development between the coast to the west and I-5 to the east along the entire length of the project area.

In sum, the historic topographic map and aerial photograph review indicates that the central portion of the project area has been subject to residential and commercial development since the late 19th century, with the northern and southern portions being used for agricultural purposes. However, by the 1950s the entire length of the project area appears to have been completely bounded by development.

Native American Consultation

A Sacred Lands File (SLF) search for the proposed project was requested from the NAHC on June 2, 2016. The results provided by the NAHC on June 6, 2016 did not indicate the presence of Native American cultural resources within the project area. The letter also included a list of Native American contacts.

Pursuant to the requirements of AB 52 and SB 18, requiring government-to-government consultation, the City sent consultation notification letters via certified mail to Native American groups affiliated with the project area (**Table 4**). The letters included a description of the proposed project, the project location, and a notification of the type of consultation that the City was initiating (Appendix C). To date, the City has received responses from four groups including the San Luis Rey Band of Mission Indians, the Pechanga Band of Mission Indian, the Rincon Band of Luiseño Indians, and the Pala Band of Mission Indians. In letters dated June 20, 2016, Merri Lopez-Keifer, Chief Legal Counsel for the San Luis Rey Band of Mission Indians formally requested that AB 52 and SB 18 consultation with the City be initiated. On August 11, the City conducted formal consultation with Ms. Lopez-Keifer pursuant to AB 52. Ms. Lopez-Keifer

requested that eight mitigation measures (MM Complete Streets CR-1 through -8) addressing Tribal Cultural Resources be recommended to the City's decision-making body. The City agreed to incorporate the mitigation measures recommended by Ms. Lopez-Keifer, thus concluding consultation between the City and the San Luis Rey Band of Mission Indians. These mitigation measures are included in the Recommendations section of this report.

TABLE 4
NATIVE AMERICAN CONSULTATION

Contact	Tribe/ Organization	Consultation Type	Date Letter Mailed	Response Received	Consultation Results
Shasta Gaughen, Tribal Historic Preservation Officer	Pala Band of Mission Indians	AB 52	5/24/2016	In a letter dated June 16, 2016, Ms. Gaughen formally requested that AB 52 consultation be initiated	-
		SB 18	5/24/2016	No response regarding SB 18 consultation	
Mark Macarro, Chairperson	Pechanga Band of Mission Indians	AB 52	5/24/2016	In a letter dated June 10, 2016, the Pechanga formally requested that AB 52 consultation be initiated	-
		SB 18	5/24/2016	In a letter dated June 14, 2016, the Pechanga formally requested that SB 18 consultation be initiated	
Randall Majel, Chairperson	Pauma and Yuima Reservation	AB 52	5/24/2016	No response regarding AB 52 consultation	-
		SB 18	5/24/2016	No response regarding SB 18 consultation	
Lavonne Peck, Chairwoman	La Jolla Band of Mission Indians	AB 52	5/24/2016	No response regarding AB 52 consultation	-
		SB 18	5/24/2016	No response regarding SB 18 consultation	
Rosmary Morillo, Chairperson	Soboba Band of Mission Indians	AB 52	5/24/2016	No response regarding AB 52 or SB 18 consultation	-
		SB 18	5/24/2016	No response regarding SB 18 consultation	
Bo Mazzetti, Chairperson	Rincon Band of Mission Indians	AB 52	5/24/2016	In a letter dated June 23, 2016, Rincon's Cultural Resources Manager, Vincent Whipple, recommended that a Native American monitor be present during project-related ground disturbing activities	-
		SB 18	5/24/2016		
Tribal Council	San Luis Rey Band of Mission Indians	AB 52	5/24/2016	In a letter dated June 20, 2016, the San Luis Rey formally requested that AB 52 consultation be initiated	The City will incorporate Mitigation Measures Complete Streets CR-1 through -8
		SB 18	5/24/2016	In a letter dated June 20, 2016, the San Luis Rey formally requested that SB 18 consultation be initiated	
-	Torres Martinez Desert Cahuilla Indians	AB 52	5/24/2016	No response regarding AB 52 consultation	-
		SB 18	5/24/2016	No response regarding SB 18 consultation	
Jim McPherson, Cultural Resources Department	Rincon Band of Luiseño Indians	AB 52	5/24/2016	In a letter dated June 23, 2016, Rincon's Cultural Resources Manager, Vincent Whipple, recommended that a Native American monitor be present during project-related ground disturbing activities	-
		SB 18	5/24/2016		

In letters dated June 10, 2016 and June 14, 2016, Anna Hoover, Cultural Analyst for the Pechanga Band of Mission Indians, stated that the project area falls within the Pechanga's aboriginal territory and requested AB 52 and SB 18 consultation with the City.

In a letter dated June 23, 2015, Vincent Whipple, Cultural Resources Manager for the Rincon Band of Luiseño Indians, stated that the proposed project is located within Rincon's specific area of cultural interest. Mr. Whipple expressed concern that proposed project implementation could result in the inadvertent discovery of cultural resources and recommended that a Native American monitor be present during all project-related ground disturbing activities. To date, the Rincon Band of Luiseño Indians has not formally requested AB 52 or SB 18 consultation with the City.

In a letter dated June 16, 2016, Shasta Gaughen, Tribal Historic Preservation Officer for the Pala Band Mission Indians, stated that the proposed project is located within Pala's Traditional Use Area (TUA) and formally requested AB 52 consultation with the City be initiated. To date, Pala has not requested SB 18 consultation with the City.

Geoarchaeological Review

A desktop geoarchaeological review of the project area was conducted by ESA geoarchaeologist Chris Lockwood, Ph.D., R.P.A. The following paragraphs present the results of Dr. Lockwood's research.

Geology

During the Last Glacial Maximum prior to 20,000 years ago, global sea levels were up to 400 feet lower than modern conditions (Berger 2008) and the California shoreline was well west of its current position. As conditions warmed and glaciers melted, there was a rapid rise in sea levels during the Late Pleistocene and Early Holocene; during this time the shoreline was still to the west of its current location. The rate of sea level rise slowed during the Middle Holocene, and sea levels in Southern California have risen approximately 20 to 25 feet over the last 6,000 years (Reynolds and Simms 2015). The rise in sea level led to a reduction in base level and increased deposition along the lower reaches of channels flowing into the Pacific Ocean, building alluvial floodplains and marshes.

The project area is underlain by late to middle Pleistocene-aged (approximately 80,000 to 200,000 years old) paralic (interfingering marine and continental) deposits (Kennedy and Tan 2007). Due to their age, the Pleistocene deposits are considered to have a very low potential to contain archaeological resources, except where the upper portion of this unit has been preserved and overlain by latest Pleistocene and Holocene alluvium or imported fill. Areas containing latest Pleistocene to Holocene alluvium have been mapped at the crossing of the San Luis Rey River, the Loma Alta Creek, and adjacent to Buena Vista Lagoon. Such alluvium is considered to have a high potential to contain buried archaeological resources.

Soils

Soils along most of the corridor have been mapped as Tujunga sandy loam (NRCS 2016). The Tujunga series consists of very deep, somewhat excessively drained soils formed in alluvium from granitic sources. Tujunga soils are on alluvial fans and floodplains, including urban areas. Slopes range from 0 to 9 percent. Restrictive features are typically deeper than 80 inches. In urban areas there is often a thin layer of human-transported material at surface. The typical soil pedon (profile) consists of a thin A-horizon overlying multiple alluvial C-horizons. Where present, soil structure is weak and fine, reflecting limited time since deposition of the parent material and beginning of soil formation. The apparent youthfulness of this soil would be consistent with Holocene deposition of parent material. The significant depth to restrictive features implies that past human occupations within the floodplain have the potential to have been inundated and buried by alluvial deposits.

Archaeological Sensitivity

Late Pleistocene to Early Holocene archaeological sites (if present) are likely to be oriented towards terrestrial subsistence resources, given the substantial distance to the coast and marine resources during that period. As sea level continued to rise, however, marine and estuary resources would have become more prevalent. As noted above, areas containing late Pleistocene to Holocene alluvial deposits (i.e., in the vicinity of the San Luis Rey River, Loma Alta Creek, and Buena Vista Lagoon) are considered sensitive for buried archaeological sites. Other portions of the project area are considered to have a lower potential for intact buried archaeological resources due to the age of the natural surface deposits.

Cultural Resources Survey

Methods

Given that the project area is almost entirely developed, with buildings, landscaping, and pavement throughout, a reconnaissance-level cultural resources survey was employed for most of the project area. The minimal areas of exposed ground within the project area were subject to an intensive pedestrian survey. The survey was conducted by ESA archaeologist Michael Vader, B.A. on August 10, 2016. The survey was aimed at identifying historic-period built environment resources within or immediately adjacent to the Complete Streets improvements, as well as any traces of bare ground surfaces that could be inspected for the presence of archaeological resources. The street addresses of all previously recorded built environment resources located within the Complete Streets improvements, as indicated by the SCIC, were revisited and photographed. The single archaeological resource (CA-SDI-14058) overlapping the Complete Streets improvements was revisited, intensively inspected, and photographed.

Because the Incentive District is being analyzed at a programmatic level it was not included as part of the reconnaissance-level survey conducted for the proposed project. The results of the cultural resources assessment of the Incentive District, presented below, are based on the SCIC records search only. Also included are recommendations for mitigation measures that should be

implemented prior to the development of future projects that may be contemplated under the Incentive District.

Results

The project area and immediate vicinity is largely paved over with little to no ground surface visibility throughout (**Figure 4**). However, some unobscured ground surface is present along the wester margins of the southern portion of the project area near the Buena Vista Lagoon (Figure 4). This unobscured ground surface contained sparse seasonal grasses and was intensively inspected for the presence of archaeological resources. No resources were identified.

As a result of the cultural resources survey the one archaeological resource (CA-SDI-14058) overlapping the Complete Streets improvements was revisited and 17 of the 20 previously documented built environment resources were identified (**Figure 5 - REDACTED**; **Table 5**). Resource CA-SDI-15870, a prehistoric archaeological site located immediately adjacent to the Complete Streets improvements, was not revisited because its mapped location is within the San Luis Rey River. The following paragraphs describe the resources revisited during the cultural resources survey.



Survey conditions in central portion of complete street improvements (view to north)



Survey conditions in southern portion of complete street improvements (view to south)

SOURCE: ESA, 2016

Figure 4
Survey Photos

Figure 5 Survey Results Map - Redacted for Public Version

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TABLE 5
SURVEY RESULTS

Primary # (P-37-)	Permanent Trinomial (CA-SDI-)	Other Identifier	Description	Relocated
Archaeological Resources				
014266	14058	-	Prehistoric archaeological site: shell scatter	Not relocated
019165	15870	-	Prehistoric archaeological site: shell scatter	Not relocated
Built Environment Resources				
035464	-	1151 South Coast Highway	Goodyear Express Tire Building	Relocated
-	-	123 Coast Highway	Craftsman-style single-family residence constructed in 1908	Not relocated
-	-	133 Coast Highway	Keisker Hotel Building constructed in 1927	Relocated
-	-	201 Coast Highway	First National Bank of Oceanside Building constructed in 1925	Relocated
-	-	202 Coast Highway	Bank of Italy Building constructed in 1925	Relocated
-	-	217 Coast Highway	Theater constructed in 1936	Relocated
-	-	232 Coast Highway	Commercial building constructed in 1929	Relocated
-	-	301 Coast Highway	B.A. and Marian Mason Building constructed in 1932	Relocated
-	-	309 Coast Highway	D.G. Harrington Building constructed in 1908	Relocated
-	-	402 Coast Highway	Star Theater constructed in 1956	Relocated
-	-	501 Mission Avenue	J.E. Jones Hardware Building constructed in 1912	Relocated
-	-	505 Mission Avenue	J.C. Penny Company Building constructed in 1924	Relocated
-	-	510 Sportfisher Way	Victorian-style single-family residence constructed in 1891	Not relocated
-	-	524 Coast Highway	Victorian-style single-family residence (Weitzel Residence) constructed in 1888	Relocated
-	-	600 Coast Highway	Landscape feature consisting of palm trees	Relocated
-	-	631 Coast Highway	Commercial building constructed in 1928	Relocated
-	-	1310 Coast Highway	I.O.O.F. Cemetery	Relocated
-	-	2002 South Coast Highway	Commercial building constructed in 1947	Relocated
-	-	Pier View Way	Landscape feature consisting of the Melchoir Pieper Gardens	Not relocated
-	-	San Luis Rey River Bridge	Steel-framed bridge constructed in 1929	Relocated

Archaeological Resources

Resource CA-SDI-14058

The mapped location of CA-SDI-14058 was revisited during the survey. The resource is located in a graded lot that is composed of compacted dirt and gravel (**Figure 6 - REDACTED**). The lot was intensively surveyed but no artifacts or features identified with CA-SDI-14058 were identified. However, the resource's DPR form notes that artifacts were found within cut banks and rodent burrow spoils (Pigniolo and Beck 1994a), indicating that the resource is likely buried.

Resource CA-SDI-15870

The mapped location of CA-SDI-15870 is within the San Luis Rey River approximately 150 feet beneath the Coast Highway corridor. Given the resource's location within the riverbed, which prohibits access, and its distance from the Complete Streets improvements, it was not revisited during the pedestrian survey.

Built Environment Resources

Resource P-37-035464

This resource consists of the Goodyear Tire Express Building located on the northwest side of the intersection of Oceanside Boulevard and Coast Highway. The resource was found to be consistent with previous documentation as consisting of a one-story car garage with an L-shaped plan (Figure 6).

123 Coast Highway

This resource consists of a Craftsman-style single-family residence constructed in 1908. The mapped location of the building was visited during the survey, but no structure fitting the description of the resource could be identified.

133 Coast Highway

This resource consists of the Keisker Hotel Building, also known as the Dolphin Hotel, constructed in 1927. The building was identified during the survey on the northwest corner of the intersection of Topeka Street and Coast Highway. The building is currently used as a commercial space and hotel (**Figure 7**).

201 Coast Highway

This resource consists of the First National Bank of Oceanside Building constructed in 1926. The building was identified during the survey on the northwest corner of the intersection of Mission Avenue and Coast Highway. The building is currently used as a souvenir shop (Figure 7).

Photo of CA-SDI-14058 - REDACTED

Overview of mapped location of CA-SDI-14058 (view to north)



Overview of P-37-035464 (view to south)

SOURCE: ESA, 2016

Coast Highway Corridor Study 130217.00

Figure 6
Resource Photos



Overview of 133 Coast Highway (view to west)



Overview of 201 Coast Highway (view to north)

SOURCE: ESA, 2016

Coast Highway Corridor Study 130217.00

Figure 7
Resource Photos

202 Coast Highway

This resource consists of the Bank of Italy Building constructed in 1927. The building was identified during the survey on the northeast side of the intersection of Mission Avenue and Coast Highway. The building is currently used as a restaurant (**Figure 8**).

217 Coast Highway

This resource consists of a theatre constructed in 1936. The building was identified during the survey southwest of the intersection of Pier View Way and Coast Highway. The building is used as the Brookes Sunshine Theater (Figure 8).

232 Coast Highway

This resource consists of the R.J. Meyers Building, a commercial building constructed in 1929. The building was identified during the survey northeast of the intersection of Michigan Avenue and Coast Highway. The building is currently used as a restaurant (**Figure 9**).

301 Coast Highway

This resource consists of the B.A. and Marian Mason Building, a commercial building constructed in 1932. The building was identified during the survey on the southwest corner of the intersection of Michigan Avenue and Coast Highway. The building is currently used as a custom auto shop (Figure 9).

309 Coast Highway

This resource consists of the D.G. Harrington Property, a single-family residence constructed in 1908. The building was identified during the survey southwest of the intersection of Michigan Avenue and Coast Highway. The building is currently used as a restaurant (**Figure 10**).

402 Coast Highway

This resource consists of the Star Theater constructed in 1956. The building was identified during the survey on the northeast corner of Civic Center Drive and Coast Highway. The building is still used as a theater (Figure 10).



Overview of 202 Coast Highway (view to NE)



Overview of 217 Coast Highway (view to west)

SOURCE: ESA, 2016

Coast Highway Corridor Study 130217.00

Figure 8
Resource Photos



Overview of 232 Coast Highway (view to east)



Overview of 301 Coast Highway (view to NW)

SOURCE: ESA, 2016

Coast Highway Corridor Study 130217.00

Figure 9
Resource Photos



Overview of 309 Coast Highway (view to west)



Overview of 402 Coast Highway (view to NE)

SOURCE: ESA, 2016

Figure 10
Resource Photos

501 Mission Avenue

This resource consists of the J.E. Jones Hardware Store Building, a commercial building constructed in 1906. The building was identified during the survey on the southeast corner of the intersection of Mission Avenue and Coast Highway. The building is currently used as office and commercial space (**Figure 11**).

505 Mission Avenue

This resource consists of the J.C. Penny Company Building, a commercial building constructed in 1924. The building was identified during the survey southeast of the intersection of Mission Avenue and Coast Highway. The building is currently used as commercial space and an Odd Fellows meeting hall (Figure 11).

510 Sportfisher Way

This resource consists of the Samuel Hunting Residence, a Victorian-style single-family residence constructed in 1890. The address was visited during the survey, and a commercial building, not a Victorian-style residence, is located at the address (**Figure 12**).

524 Coast Highway

This resource consists of the Wietzel Residence, a Victorian-style single-family residence constructed in 1888. The building was identified during the survey on the east side of Coast Highway midway between Minnesota Avenue and Washington Avenue. The building is currently used as a restaurant (Figure 12).

600 Coast Highway

This resource is a landscape feature that consists of palm trees lining both sides of the 600 block of Coast Highway. The palm trees were identified during the survey and were found to be in good condition (**Figure 13**).

631 Coast Highway

This resource consists of a commercial building constructed in 1926. The building was identified during the survey on the northwest corner of the intersection of Wisconsin Avenue and Coast Highway. The building is currently used as a diner (Figure 13).



Overview of 501 Mission Avenue (view to east)



Overview of 505 Mission Avenue (view to south)

SOURCE: ESA, 2016

Figure 11
Resource Photos



Overview of mapped location of 510 Sportfisher Way (view to north)



Overview of 524 Coast Highway (view to SE)

SOURCE: ESA, 2016

Figure 12
Resource Photos



Overview of mapped location of 600 Coast Highway (view to north)



Overview of 631 Coast Highway (view to west)

SOURCE: ESA, 2016

Coast Highway Corridor Study 130217.00

Figure 13
Resource Photos

1310 Coast Highway

This resource consists of the I.O.O.F Cemetery, which has been in use since 1895. The cemetery was identified during the survey southeast of the intersection of Godfrey Street and Coast Highway. The cemetery appears to be in good condition and is well maintained (**Figure 14**).

2002 South Coast Highway

This resource consists of a commercial building constructed in 1947. The building was identified during the survey on the southeast corner of the intersection of Vista Way and Coast Highway. The building is currently used as a restaurant (Figure 14).

Pier View Way

This resource is a landscape feature consisting of the Melchoir Pieper Gardens, which were active between 1888 and the mid-20th century. The mapped location of the resource was visited during the survey, and the area has been developed and is now the location of City municipal buildings and landscaping that includes a fountain (**Figure 15**). No indication of the gardens was observed.

San Luis Rey River Bridge (CA 57 C-322)

This resource consists of a steel-framed, Warren deck truss bridge built by C.T. Gutleben in 1929 (bridgehunter.com 2016). The bridge was identified during the survey south of the intersection of Monterey Drive and Coast Highway and appears to be well maintained (Figure 15).

Summary and Recommendations

The following sections: (1) summarize the results of the cultural resources assessment for the proposed project and discuss potential impacts to archaeological and built environment resources, and (2) provide recommendations for appropriate mitigation measures. Separate discussions are provided for the Complete Streets improvements and the Incentive District given their differing levels of technical analysis.

Summary and Impacts Assessment – Complete Streets Improvements

Tribal Cultural Resources

While a search of the Sacred Lands file at the NAHC did not identify any tribal cultural resources within the project area, several Native American tribes, including the San Luis Rey Band of Mission Indians, the Pechanga Band of Mission Indian, the Rincon Band of Luiseño Indians, and the Pala Band of Mission Indians, have expressed an interest in the proposed project and concerns about tribal resources that could be impacted. Consultation between the tribes and the City, per AB 52, is ongoing. In addition, mitigation measures provided by the San Luis Rey Band of Mission Indians (included below) have been accepted by the City and would be implemented for the proposed project.



Overview of 1310 Coast Highway (view to east)



Overview of 2002 South Coast Highway (view to NE)

SOURCE: ESA, 2016

Figure 14
Resource Photos



Overview of mapped location of Pier View Way (view to NE)



Overview of San Luis Rey River Bridge (view to south)

SOURCE: ESA, 2016

Figure 15
Resource Photos

Archaeological Resources

The SCIC records search identified two archaeological sites (CA-SDI-14058 and -15870) within or adjacent to the Complete Streets improvements. No additional archaeological resources were identified during the pedestrian survey.

Resource CA-SDI-14058

The mapped location of CA-SDI-14058, a prehistoric archaeological site, was revisited during the survey, but no indication of the site was detected. Although no surface manifestation of CA-SDI-14058 was found, it is possible that a buried cultural deposit may be present. If a subsurface component does exist, any ground disturbance could result in a significant impact. That said, project-related activities in the area do not propose any ground disturbing activity and would consist of reducing the Coast Highway from two lanes to one lane in each direction, striping of Class II bicycle lanes on both sides of the street, and striping for back-in angled parking would be provided on the west side of street. On-street parking currently located along the eastern side. As such, the Complete Streets improvements portion of the proposed project would not have an impact on the resource.

Resource CA-SDI-15870

The mapped location of CA-SDI-15870 is within the San Luis Rey River approximately 150 feet beneath the bridge that passes over the river. As such, CA-SDI-15870 was not revisited during the survey. As no construction activity is planned for the river bed below the bridge, the resource would not be impacted by project-related ground disturbance associated with the project.

Built Environment Resources

The SCIC records search identified 27 built environment resources within or immediately adjacent to the project area. Of these, 19 are located immediately adjacent to the Complete Streets improvements. One additional resource, the San Luis Rey River Bridge (Bridge# CA 57 C-322), is not on file at the SCIC, but has been identified within the Complete Streets improvements upon reviewing the Caltrans historic bridge inventory. Of the 20 built environment resources located within or immediately adjacent to the Complete Streets improvements (including the bridge), 17 were relocated as a result of the survey. The buildings that could not be relocated are presumed to have been relocated or demolished since originally recorded.

The San Luis Rey River Bridge is the only built environment resource located within the Complete Streets improvements; the others are located adjacent to the Complete Streets improvements. The San Luis Rey River Bridge is not eligible for listing in the NRHP, but has not been evaluated for inclusion in the CRHR or as a City Historical Site. The only proposed alteration to the bridge would be restriping to provide a Class II bicycle lane in both directions. Proposed project-level activities for the bridge do not include any ground disturbance or modification to the structure itself. As such, no physical or visual alterations to the bridge are proposed and the resource would not be significantly impacted by the proposed project.

The remaining built environment resources consist largely of commercial buildings and landscape features located on the margins of the Complete Streets improvements. As such, these resources would not be directly impacted by the project. However, there is the potential that they could be indirectly (e.g., visually) impacted. Of these resources, only one (the Keisker Hotel Building at 133 Coast Highway) has been found eligible for the CRHR (as well as the NRHP), though some are listed as City Historical Sites, and others have been evaluated for the NRHP and for listing as City Historical Sites but have been found not eligible (see Table 3). Regardless, aside from the Keisker Hotel Building, none has been evaluated for listing in the CRHR. The project proposes the following alterations to the Coast Highway corridor: reduce portions of the corridor from four lanes to two lanes; restriping for a continuous Class II bicycle lane from Harbor Drive to the south city limit; mid-block crosswalks to facilitate safe and convenient pedestrian crossings of the corridor; and the construction of roundabouts in place of traffic signals where physically feasible. These alterations to the Coast Highway corridor would not physically impact any of the built environment resources located immediately adjacent to the Complete Streets improvements. Moreover, given that the improvements would not drastically alter the visual characteristics of the Coast Highway, and would not introduce any new visually intrusive elements, visual impacts to the built environment resources are not anticipated. As such, the built environment resources within the Complete Streets improvements would not be significantly impacted by the project.

Summary – Incentive District

Tribal Cultural Resources

While a search of the Sacred Lands file at the NAHC did not identify any tribal cultural resources within the project area, at least two tribes, the San Luis Rey Band of Mission Indians and the Pechanga Band of Mission Indian, have expressed an interest in the General Plan amendment and have requested consultation per SB 18. Consultation between these tribes and the City is ongoing.

Archaeological Resources

The SCIC records search identified three archaeological resources within or immediately adjacent to the Incentive District (CA-SDI-14059 and -17796, and P-36-033869). Because the Incentive District is analyzed programmatically it was not included as part of the pedestrian survey and the three previously recorded archaeological resources were not revisited.

Built Environment Resources

Of the 28 resources identified in the background studies, 19 are located within or immediately adjacent to the Incentive District. Eleven of these are also located within or immediately adjacent to both the Complete Streets improvements (as discussed above). Of these, only the Keisker Hotel Building at 133 Coast Highway has been found eligible for the CRHR (as well as the NRHP). Others are listed as City Historic Sites, while others have been evaluated and found ineligible for listing in both the NRHP and as City Historical Sites (see Table 3). The remainder, however, have not been formally evaluated for listing in the CRHR.

Recommendations

Complete Streets Improvements

Although the Complete Streets improvements area is largely developed, there exists the possibility that subsurface prehistoric and historic-period archaeological resources have been paved over and are obscured. The SCIC records search indicates that 33 previously recorded archaeological resources have been documented within a 0.5–mile radius of the Complete Streets improvements. Furthermore, the geoarchaeological review indicates that the portions of the Complete Streets improvements located in the vicinity of the San Luis Rey River, Loma Alta Creek, and Buena Vista Lagoon are sensitive for the presence of prehistoric archaeological resources. As such, the Complete Streets improvements should be considered sensitive for the presence of archaeological resources. During their August 11, 2016 meeting with the City, the San Luis Rey Band of Mission Indians provided a list of recommended mitigation measures for consideration in the EIR. These mitigation measures were accepted by the City for implementation during the Complete Streets improvements.

The following recommended mitigation measures provided by the San Luis Rey Band of Mission Indians (MM Complete Streets CR-1 through -8) and ESA (MM Complete Streets CR-9) would ensure that the Complete Streets improvements would result in less than significant impacts to historical or unique archaeological resources under CEQA:

> **MM Complete Streets CR-1:** Prior to the issuance of a grading permit, the City of Oceanside shall enter into a pre-excavation agreement with a representative of the San Luis Rey Band of Mission Indians, otherwise known as a Tribal Cultural Resources Treatment and Tribal Monitoring Agreement. A copy of the agreement shall be included in the grading plan submittals for the grading permit. The purpose of this agreement shall be to formalize protocols and procedures between the Applicant/Owner and the San Luis Rey Band for the protection and treatment of, including but not limited to, Native American human remains, funerary objects, cultural and religious landscapes, ceremonial items, traditional gathering areas and cultural items, located and/or discovered through a monitoring program in conjunction with the construction of the Complete Streets improvements, including additional archaeological surveys and/or studies, excavations, geotechnical investigations, grading, and all other ground disturbing activities, such as the installation and/or removal of infrastructure and existing foundations, that may impact the native soils subsurface to the existing road bed.
>
> **MM Complete Streets CR-2:** Prior to the issuance of a grading permit, the grading contractor shall provide a written and signed letter to the City Planner stating that a Qualified Archaeologist and Luiseño Native American Monitor have been retained at the grading contractor's expense to implement the monitoring program, as described in the pre-excavation agreement.
>
> **MM Complete Streets CR-3:** Prior to the release of the grading bond, a monitoring report and/or evaluation report, if appropriate, which describes the results, analysis and conclusions of the archaeological monitoring program (e.g., data recovery plan) shall be

submitted by the Qualified Archaeologist, along with the Luiseño Native American monitor's notes and comments, to the City Planner for approval.

MM Complete Streets CR-4: The Qualified Archaeologist shall maintain ongoing collaborative consultation with the Luiseño Native American monitor during all ground disturbing activities that may impact subsurface native soils. The requirement for the monitoring program shall be noted on all applicable construction documents, including demolition plans, grading plans, etc. The grading contractor shall notify the City Planner of the start and end of all ground disturbing activities.

MM Complete Streets CR-5: The Qualified Archaeologist and Luiseño Native American Monitor shall attend all applicable pre-construction meetings with the general contractor and/or associated subcontractors to present the archaeological monitoring program. The Qualified Archaeologist and Luiseño Native American Monitor shall be present onsite during any ground disturbing activities that may impact subsurface native soils.

MM Complete Streets CR-6: The Qualified Archaeologist or the Luiseño Native American monitor may halt ground disturbing activities if unknown archaeological artifact deposits or cultural features are discovered. Ground disturbing activities shall be directed away from these deposits to allow a determination of potential importance. Isolates and clearly non-significant deposits will be minimally documented in the field, and before grading proceeds these items shall be given to the San Luis Rey Band so that they may be repatriated at the site on a later date. If a determination is made that the unearthed artifact deposits or cultural features are considered potentially significant, the San Luis Rey Band shall be notified and consulted with in regards to the respectful and dignified treatment of those resources.

The avoidance and protection of the significant cultural resource and/or unique archaeological resource is the preferable mitigation. If however, a data recovery plan is authorized by the City as the Lead Agency under CEQA, the San Luis Rey Band shall be notified and consulted regarding the drafting and finalization of any such recovery plan. For significant artifact deposits or cultural features that are part of a data recovery plan, an adequate artifact sample to address research avenues previously identified for sites in the project area will be collected using professional archaeological collection methods. If the Qualified Archaeologist collects such resources, the Luiseño Native American monitor must be present during any testing or cataloging of those resources. Moreover, if the Qualified Archaeologist does not collect the cultural resources that are unearthed during the ground disturbing activities, the Luiseño Native American monitor, may at their discretion, collect said resources and provide them to the San Luis Rey Band for respectful and dignified treatment in accordance with the Tribe's cultural and spiritual traditions.

MM Complete Streets CR-7: Any and all uncovered tribal cultural resources of Native American importance shall be returned to the San Luis Rey Band of Mission Indians, and/or the Most Likely Descendant, if applicable, and not be curated.

MM Complete Streets CR-8: As specified by California Health and Safety Code Section 7050.5, if human remains are found in the project area during construction or during archaeological work, the person responsible for the excavation, or his or her authorized representative, shall immediately notify the San Diego County Coroner's office by telephone. No further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains shall occur until the Coroner has made the necessary findings as to origin and disposition pursuant to PRC 5097.98. If such a discovery occurs, a temporary construction exclusion zone shall be established, surrounding the area of the discovery so that the area would be protected, and consultation and treatment could occur as prescribed by law. By law, the Coroner will determine within two working days of being notified if the remains are subject to his or her authority. If the Coroner recognizes the remains to be Native American, he or she shall contact the NAHC within 24 hours. The NAHC will make a determination as to the Most Likely Descendant. If Native American remains are discovered, the remains shall be kept in-situ, or in a secure location in close proximity to where they were found, and the analysis of the remains shall only occur onsite in the presence of a Luiseño Native American monitor.

MM Complete Streets CR-9: The qualified archeologist, or an archaeologist working under the direction of the qualified archaeologist, and the Luiseño Native American monitor shall conduct pre-construction cultural resources sensitivity training to inform construction personnel of the types of cultural resources that may be encountered, and of the proper procedures to be enacted in the event of an inadvertent discovery of archaeological resources or human remains. The applicant shall ensure that construction personnel are made available for and attend the training and shall retain documentation demonstrating attendance.

Incentive District

For the Incentive District study area, three archaeological resources and of 19 built environment resources were identified. The three archaeological resources include one prehistoric archaeological site (CA-SDI-14059), one historic-period archeological site (CA-SDI-17796), and one multicomponent archaeological site (P-36-033869). None of the three archaeological resources have been previously evaluated for inclusion in the NRHP, CRHR, or as a City Historical Site. Of the 19 built resources, eight (216 South Tremont Street, 308 Missouri Avenue, 321 South Tremont Street, 327 South Tremont Street, 401 Seagaze Drive, 405 South Tremont Street, 510 Kelley Street, and 517 Michigan Avenue) are located solely within the Incentive District, and 11 are located both within the Complete Streets improvements area and Incentive District (123 Coast Highway, 133 Coast Highway, 232 Coast Highway, 301 Coast Highway, 309 Coast Highway, 524 Coast Highway, 600 Coast Highway, 631 Coast Highway, 1151 South Coast Highway, 1310 Coast Highway, and 2002 South Coast Highway). Of the 19 built

environment resources within the Incentive District, one (133 Coast Highway) is eligible for the CRHR. The other 18 have not been evaluated for inclusion in the CRHR.

To ensure that archaeological and historic resources are not significantly impacted by future projects that could be implemented under the Incentive District provisions, the following mitigation measures would be required. These measures would be triggered when individual development projects are proposed under the Incentive District.

> **MM Incentive District CR-1:** Individual development projects implemented under the Incentive District shall be subject to a Phase I cultural resources inventory (cultural resources inventory) prior to the City's approval of project plans. This requirement shall be implemented for all projects for which the Incentive District is employed (Administrative Development Plan Review, Development Plan Review, and Conditional Use Permit processing requirements as specified in Section 1203 of the Coast Highway Incentive District). The cultural resources inventory would consist of: a cultural resources records search to be conducted at the South Coastal Information Center; scoping with the California Native American Heritage Commission (NAHC); a pedestrian archaeological survey if visible ground surface is present; and recordation of all identified archaeological resources on California Department of Parks and Recreation 523 forms. The cultural resources inventory shall be carried out by a qualified archaeologist, defined as an archaeologist meeting the Secretary of the Interior's Standards for professional archaeology, and shall be conducted in consultation with the appropriate Native American groups as identified through outreach to the NAHC and through consultation.
>
> If potentially significant cultural resources are encountered during the survey, and if the project has the potential to impact those resources, the City shall require that the resources be evaluated for their eligibility for listing in the CRHR and for significance as unique archaeological resource. Recommendations shall be made for the treatment of unique archaeological resources or resources found eligible for the CRHR should the development project have the potential to adversely impact the resources. These studies shall be conducted in consultation with the City and the appropriate Native American groups as identified through consultation. Project redesign and preservation in place shall be the preferred means of mitigation to avoid impacts to significant cultural resources, including prehistoric and historic archaeological sites, locations of importance to Native Americans, human remains, historical buildings, structures and landscapes. Methods of avoidance may include, but shall not be limited to, project re-design or identification of protection measures such as capping or fencing. If it is demonstrated that resources cannot be avoided, the qualified archaeologist shall develop additional treatment measures, which may include data recovery or other appropriate measures, in consultation with the City and appropriate Native American groups as identified through consultation.
>
> In addition, the project proponent shall retain archaeological monitors and Native American monitors during ground-disturbing activities that have the potential to impact

significant cultural resources as determined by a qualified archaeologist in consultation with the City and the appropriate Native American groups.

During project-level construction, should prehistoric or historic subsurface cultural resources be discovered, all activity in the vicinity of the find shall stop and a qualified archaeologist shall be contacted to assess the significance of the find. If any find is determined to be significant, meaning it qualifies as a unique archaeological resource or is determined eligible for the CRHR, the archaeologist shall determine, in consultation with the City and the appropriate Native American groups, suitable avoidance measures, data recovery measures, or other appropriate mitigation, such as capping.

All significant cultural materials recovered, either prior to or during construction, shall be, as necessary and at the discretion of the consulting archaeologist and in consultation with the appropriate Native American groups, subject to scientific analysis, professional museum curation, and documentation according to current professional standards. If materials need to be recovered, protocols for proper removal and treatment shall be implemented. The specific protocols for proper removal shall be detailed in a monitoring or data recovery plan prior to recovery of the materials.

MM Incentive District CR-2: Project-level development on individual properties containing structures at least 50 years old shall be subject to a historic built environment survey which will include an evaluating of the potential historic significance of the structures, prior to the City's approval of project plans. This requirement shall be implemented for all projects on properties for which the Incentive District is employed which contain existing structures (Administrative Development Plan Review, Development Plan Review, and Conditional Use Permit processing requirements as specified in Section 1203 of the Coast Highway Incentive District). The survey shall be carried out by a qualified historian or architectural historian meeting the Secretary of the Interior's Standards for Architectural History. If potentially significant historic resources are encountered during the survey, demolition or substantial alteration of such resources identified shall be avoided, as specified by the qualified historian or architectural historian.

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APPENDIX A
Personnel

Michael R. Bever, PhD, RPA

Program Manager

Dr. Bever has over 20 years of experience in archaeology and cultural resources management. He has worked throughout the western United States, with a focus in California. He has experience and specialized training in project management, business development, and cultural resources practice oversight, and has directed projects involving a wide breadth of resource types in compliance with federal and state laws and regulations. Dr. Bever's experience includes all manner of cultural resources studies and documentation for projects both large and small, and he has presented various cultural resources management training courses in both professional and academic settings. In addition to work in cultural resources management, Dr. Bever has held tenure-track professorships at the University of Texas at Austin and the University of Nevada, Reno. A published expert in the earliest prehistory of North America, he is well-versed in archaeological research design and all aspects of archaeological field and laboratory research.

Michael Vader

Associate Archaeologist

Michael is an archaeologist and environmental compliance monitor with experience working on survey, data recovery, and monitoring projects. Michael has experience with project management, has led crews on multiple surveys, and is familiar with environmental compliance documents. He has worked on a variety of energy and water infrastructure projects throughout California, including projects in Riverside, San Diego, Imperial, San Bernardino, Los Angeles, Orange, Santa Barbara, San Luis Obispo, Kern, Fresno, Madera, and Inyo Counties. Michael regularly works as part of a team, coordinating with construction personnel and Native American representatives.

APPENDIX B – CONFIDENTIAL

Records Search
(REDACTED FOR PUBLIC VERSION)

APPENDIX C

Native American Correspondence

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

www.esassoc.com

June 2, 2016

Katy Sanchez
Native American Heritage Commission
1550 Harbor Boulevard, Suite 100
West Sacramento, CA 95691
FAX- 916-373-5471

Subject: **SLF Search Request for Oceanside Highway Coast Corridor Study Project (D130217.00)**

Dear Ms. Sanchez:

Environmental Science Associates (ESA) is preparing an Environmental Impact Report (EIR) for the City of Oceanside (City) Oceanside Highway Coast Corridor Study Project (Project). The Project is located in the City of Oceanside, within San Diego County. The purpose of the Project is to improve transportation and amend the Zoning Ordinance to create a Coast Highway Incentive Overlay District (Overlay).

The transportation improvements includes: Converting Coast Highway from four lanes to two lanes throughout the corridor, with segments of two southbound travel lanes between State Route 76 and Surfrider Way, and south of Kelly Street to Eaton Street; Construction of several new roundabouts and new on-street parking; Continuous bicycle facilities and streetscape improvements within the corridor would be provided; And Pier View Way, between Coast Highway and Freeman Street would be permanently closed to allow for weekly and special events, such as the Farmers' Market, weddings, and holiday events.

The purpose of the Overlay is to implement the Coast Highway Vision and Strategic Plan by encouraging redevelopment and revitalization of the Coast Highway Corridor. The Overlay would provide optional overlay regulations and standards which a property owner may choose in lieu of the underlying zoning.

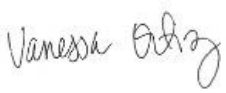
The enclosed map shows the Project area located in:

- Sections 26, 35, and 36 of the San Luis Rey USGS 7.5' Quadrangle, Township 11 South, Range 5 West;
- Sections 22, 23, 26, and 27 of the Oceanside USGS 7.5' Quadrangle, Township 11 South, Range 5 West.

In an effort to provide an adequate appraisal of all potential impacts to cultural resources that may result from the proposed Project, ESA is requesting that a records search be conducted for sacred lands or traditional cultural properties that may exist within the Project area.

Thank you for your time and cooperation regarding this matter. To expedite the delivery of search results, please fax them to 213.599.4301. Please contact Vanessa Ortiz at 323.246.6289 or vortiz@esassoc.com or Michael Bever at 619.261.4232 or mbever@esassoc.com if you have any questions.

Sincerely,



Vanessa Ortiz, M.A., R.P.A.
Cultural Resources



Michael Bever, Ph.D., R.P.A
Cultural Resources



SOURCE: City of Oceanside 2016. Oceanside and San Luis Rey topoquads

City of Oceanside Coast Highway Corridor Study. 130217

Figure 1
Record Search

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710
Fax (916) 373-5471

June 6, 2016

Vanessa Ortiz, M.A., RPA
Michael Bever, PhD., RPA
Environmental Science Associates

Sent by Email: vortiz@esassoc.com
Mbever@esassoc.com

RE: Proposed Oceanside Highway Coast Corridor Study, Cultural Resources Appraisal Project, City of Oceanside; San Luis Rey and Oceanside USGS Quadrangles, San Diego County, California

Dear Dr. Bever and Ms. Ortiz:

A record search of the Native American Heritage Commission (NAHC) *Sacred Lands File* was completed for the area of potential project effect (APE) referenced above with negative results. Please note that the absence of specific site information in the *Sacred Lands File* does not indicate the absence of Native American cultural resources in any APE.

I suggest you contact all of the listed Tribes. If they cannot supply information, they might recommend others with specific knowledge. The list should provide a starting place to locate areas of potential adverse impact within the APE. By contacting all those on the list, your organization will be better able to respond to claims of failure to consult. If a response has not been received within two weeks of notification, the NAHC requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact via email: gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Totton, M.A., PhD.
Associate Governmental Program Analyst

Native American Contact List
San Diego County
June 3, 2016

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Ewiiaapaayp Tribal Office
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(619) 669-4817

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

Distribution of this list does not relieve any person or agency of statutory responsibility as defined in Public Resources Code Sections 21080.3.1 Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Oceanside Highway Coast Corridor Study (D130217.00), Cultural Resources Assessment Project, City of Oceanside, San Luis Rey and Oceanside USGS Quadrangle, San Diego County, California.

Native American Contact List
San Diego County
June 3, 2016

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Kwaaymii Laguna Band of Mission Indians
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(760) 749-5144

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This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

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This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Oceanside Highway Coast Corridor Study (D130217.00), Cultural Resources Assessment Project, City of Oceanside, San Luis Rey and Oceanside USGS Quadrangle, San Diego County, California.

Native American Contact List
San Diego County
June 3, 2016

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(619) 445-5337

San Luis Rey Band of Mission Indians
Tribal Council
1889 Sunset Drive Luiseno
Vista , CA 92081
cjmojado@slrmissionindians.org
(760) 724-8505

(760) 724-2172 Fax

Rincon Band of Mission Indians
Bo Mazzetti, Chairperson
1 West Tribal Road Luiseno
Valley Center , CA 92082
bomazzetti@aol.com
(760) 749-1051

(760) 749-5144

San Luis Rey Band of Mission Indians
Cultural Department
1889 Sunset Drive Luiseno
Vista , CA 92081 Cupeno
cjmojado@slrmissionindians.org
(760) 724-8505

(760) 724-2172 Fax

San Pasqual Band of Indians
John Flores, Environmental Coordinator
P.O. Box 365 Diegueno
Valley Center , CA 92082
johnf@sanpasqualtribe.org
(760) 749-3200

(760) 749-3876 Fax

Kupa Cultural Center (Pala Band)
Shasta Gaughen, Assistant Director
PMB 50, 35008 Pala Temecula Rd. Luiseno
Pala , CA 92059
sgaughen@palatribe.com
(760) 891-3515

(760) 742-4543 Fax

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

Distribution of this list does not relieve any person or agency of statutory responsibility as defined in Public Resources Code Sections 21080.3.1 Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Oceanside Highway Coast Corridor Study (D130217.00), Cultural Resources Assessment Project, City of Oceanside, San Luis Rey and Oceanside USGS Quadrangle, San Diego County, California.

Native American Contact List
San Diego County
June 3, 2016

Pechanga Band of Mission Indians
Mark Macarro, Chairperson
P.O. Box 1477 Luiseno
Temecula , CA 92593
striplett@pechanga-nsn.gov
(951) 770-6000

(951) 695-1778 Fax

La Jolla Band of Luiseno Indians
Thomas Rodriguez, Chairperson
22000 Highway 76 Luiseno
Pauma Valley , CA 92061
(760) 742-3771

(760) 742-3779 Fax

Iipay Nation of Santa Ysabel
Clint Linton, Director of Cultural Resources
P.O. Box 507 Diegueno/Kumeyaay
Santa Ysabel , CA 92070
cjlinton73@aol.com
(760) 803-5694

Sycuan Band of the Kumeyaay Nation
Lisa Haws, Cultural Resource Manager
1 Kwaaypaay Court Diegueno/Kumeyaay
El Cajon , CA 92019
(619) 445-4564

Pauma Band of Luiseno Indians - Pauma & Yuima
Charles Devers, Cultural Committee
P.O. Box 369, Ext. 317 Luiseno
Pauma Valley , CA 92061
(760) 742-1289

(760) 742-3422 Fax

Manzanita Band of the Kumeyaay Nation
Nick Elliott, Cultural Resources Coordinator
P.O. Box 1302 Kumeyaay
Boulevard , CA 91905
nickmepa@yahoo.com
(619) 766-4930
(619) 925-0952 Cell
(919) 766-4957 Fax

Pechanga Cultural Resources Department
Anna Hoover, Cultural Analyst
P.O. Box 2183 Luiseño
Temecula , CA 92593
ahoover@pechanga-nsn.gov
(951) 770-8104

(951) 694-0446 Fax

Soboba Band of Luiseno Indians
Joseph Ontiveros, Cultural Resource Department
P.O. BOX 487 Luiseno
San Jacinto , CA 92581 Cahuilla
jontiveros@soboba-nsn.gov
(951) 663-5279
(951) 654-5544, ext 4137
(951) 654-4198 Fax

Kumeyaay Diegueno Land Conservancy
Mr. Kim Bactad, Executive Director
2 Kwaaypaay Court Diegueno/Kumeyaay
El Cajon , CA 92019
kimbactad@gmail.com
(619) 659-1008 Office

(619) 445-0238 Fax

Iipay Nation of Santa Ysabel
Virgil Perez, Chairperson
P.O. Box 130 Diegueno/Kumeyaay
Santa Ysabel , CA 92070
(760) 765-0845

(760) 765-0320 Fax

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This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Oceanside Highway Coast Corridor Study (D130217.00), Cultural Resources Assessment Project, City of Oceanside, San Luis Rey and Oceanside USGS Quadrangle, San Diego County, California.

Native American Contact List
San Diego County
June 3, 2016

Pala Band of Mission Indians
Robert H. Smith, Chairperson
12196 Pala Mission Road — Luiseno
Pala , CA 92059 — Cupeno
rsmith@palatribe.com
(760) 891-3500

(760) 742-3189 Fax

Ewiiaapaayp Tribal Office
Michael Garcia, Vice Chairperson
4054 Willows Road — Diegueno/Kumeyaay
Alpine , CA 91901
michaelg@leaningrock.net
(619) 445-6315

(619) 445-9126 Fax

This list is current only as of the date of this document and is based on the information available to the Commission on the date it was produced.

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This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed Oceanside Highway Coast Corridor Study (D130217.00), Cultural Resources Assessment Project, City of Oceanside, San Luis Rey and Oceanside USGS Quadrangle, San Diego County, California.

CITY OF OCEANSIDE

DEVELOPMENT SERVICES DEPARTMENT / PLANNING DIVISION

May 24, 2016

Subject: Invitation to Consult Pursuant to Assembly Bill (AB) 52 and Senate Bill (SB) 18 regarding the proposed Coast Highway Corridor Study (GPA16-00001) in the City of Oceanside, County of San Diego, California

To Whom It May Concern:

The City of Oceanside intends to post with the San Diego County Clerk-Recorder a Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the proposed project. Pursuant to the provisions of Assembly Bill (AB) 52, the City hereby extends an invitation to consult on the California Environmental Quality Act (CEQA) review of this proposed project in order to assist with identifying and/or preserving and/or mitigating project impacts to Native American cultural places including:

- Native American sanctified cemetery, place of worship, religious or ceremonial site, or sacred shrine; and

- Native American historic, cultural, or sacred site that is listed or may be eligible for listing in the California Register of Historical Resources including historic or prehistoric ruins and any burial ground, archaeological, or historic site.

The proposed project also involves a General Plan Amendment, requiring consultation per Senate Bill (SB) 18 as codified in Government Code Sec, 65352.3.

If you desire to consult with the City on the CEQA review of this project, please respond in writing within thirty (30) days of the date of this letter by either letter or email. Please direct your e-mail to jamberson@ci.oceanside.ca.us or any correspondence on this matter to:

John Amberson, Transportation Planner
Engineering Division-Development Services Dept
300 North Coast Highway
Oceanside, California 92054

Should we not receive a response within thirty (30) days, we will presume that you've declined consultation. Please don't hesitate to let me know if you have any questions or would like to discuss this proposed project. I can be reached by phone at (760) 435-6291.

Respectfully submitted,

Scott Nightingale
Senior Planner

Attachment: Project Description and Statement of Justification
Project Maps: Figures 1 and 2

Project: Coast Highway Corridor Study

Lead Agency: City of Oceanside

Project Location:

The proposed project is located primarily along Coast Highway and extends into the adjacent neighborhoods, all within the City of Oceanside. The portion of Coast Highway proposed for improvements stretches from Harbor Drive on the north to approximately 550 feet south of Eaton Street on the south (see Figure 1, Regional Location, and Figure 2, Project Area and Vicinity). The project boundaries would extend into the adjacent neighborhoods along the corridor, and may include intersection improvements at the following intersections: Pier View Way and Horne Street; Wisconsin Avenue and Ditmar Street; Oceanside Boulevard and Tremont Street; Cassidy Street and Broadway Street; and Vista Way at Freeman Street, Ditmar Street, and Stewart Street (see Figure 2, Project Area and Vicinity).

Project Description:

Transportation Improvements

The stretch of Coast Highway within the City of Oceanside is currently operating with four travel lanes, two northbound and two southbound, with limited on-street parking and no designated bicycle facilities. The proposed project would result in several changes along Coast Highway. The project would convert Coast Highway from four lanes to two lanes throughout the corridor, add 11 roundabouts, add dedicated left-turn lanes, provide additional on-street parking, and make additional roadway and intersection improvements such as raised medians.

Coast Highway Incentive Overlay District

In addition to the proposed roadway improvements, the proposed project would include an amendment to the Zoning Ordinance to create a Coast Highway Incentive Overlay District (hereafter referred to as the "Overlay"). The primary purpose of the Overlay is to implement the Coast Highway Vision and Strategic Plan by encouraging redevelopment and revitalization of the Coast Highway Corridor. The Overlay would provide optional overlay regulations and standards which a property owner may choose in lieu of the underlying zoning.

The proposed project would include a General Plan Amendment (GPA) to update the City of Oceanside's General Plan Land Use Element and Circulation Element to realize the goals and policies of the Coast Highway Vision and Strategic Plan, and to ensure consistency with the proposed roadway improvements and proposed Overlay District, and would be prepared and submitted concurrently with the proposed project. All physical improvements and changes associated with the GPA would be discussed within the EIR.

SAN LUIS REY BAND OF MISSION INDIANS

1889 Sunset Drive • Vista, California 92081
760-724-8505 • FAX 760-724-2172
www.slrmissionindians.org

June 20, 2016

John Amberson
Transportation Planner
Engineering Division
Development Services Department
City of Oceanside
300 North Coast Highway
Oceanside, CA 92054

VIA ELECTRONIC MAIL
jamberson@ci.oceanside.ca.us

RE: TRIBAL RESPONSE REGARDING THE PROPOSED GENERAL PLAN AMENDMENT FOR THE COAST HIGHWAY CORRIDOR STUDY PROJECT (GPA 16-00001) AND REQUEST FOR SB 18 CONSULTATION

Dear Mr Amerson:

We, the San Luis Rey Band of Mission Indians ("Tribe") have received and reviewed the City of Oceanside's ("City's) letter dated May 24, 2016 inviting the Tribe to meet and confer pursuant to SB 18 Consultation for the proposed General Plan Amendment (GPA 16-00001) for the Coast Highway Corridor Study ("Project") in Oceanside, CA ("Project Site/Area"). We understand that you are currently evaluating the possible negative impacts to our Luiseño Native American cultural resources that may occur from this Project's construction. The intent behind SB 18 Consultation (California Government Code Section 65352.3) is for local governments to work with tribal governments to preserve and/or to mitigate the impacts to cultural places. Thank you for requesting direct consultation with our Tribe regarding this Project.

As you are aware, we are a northern San Diego County Tribe whose traditional territory includes Camp Pendleton, the current cities of Oceanside, Carlsbad, Vista, San Marcos and Escondido, as well as the unincorporated areas in northern San Diego County, such as the communities of Valley Center, Fallbrook and Bonsall. We are resolute in the preservation and protection of cultural, archaeological and historical sites within all these jurisdictions.

After a review of this Project's General Plan Amendment notice pursuant to SB 18 Consultation and a review of the Tribe's sacred land's file, the Tribe does have serious concerns that we would like to address with the City regarding this particular Project. Therefore, the Tribe does wish to participate in a formal consultation with the City of Oceanside pursuant to SB 18 for this Project.

Our Tribe has intimate knowledge about the many discoveries made throughout the area of this Project and we strongly urge caution in assessing the land encompassing the Project for development purposes. The Tribe also respectfully requests that a Luiseño Native American monitor be present during any evaluation of potential impacts to our Native American cultural resources within the Project's property's boundaries.

Furthermore, the Tribe requests that any and all cultural resource surveys completed in the Project Area and/or for the benefit of this Project be provided to the Tribe's Cultural Department at 1889 Sunset Drive, Vista, CA 92081 at your earliest convenience and prior to our SB 18 Consultation. If digital copies are available, please send them directly to cjmojado@slrmissionindians.org.

We appreciate this opportunity to provide comments and share our concerns regarding this Project. We thank you for your assistance in protecting our invaluable Luiseño cultural resources and look forward to our SB 18 Consultation.

Sincerely,

Merri Lopez-Keifer
Chief Legal Counsel
San Luis Rey Band of Mission Indians

cc: Melvin Vernon, Tribal Captain
Carmen Mojado, Secretary of Government Relations and President of Saving Sacred Sites

SAN LUIS REY BAND OF MISSION INDIANS

1889 Sunset Drive • Vista, California 92081
760-724-8505 • FAX 760-724-2172
www.slrmissionindians.org

June 20, 2016

John Amberson
Transportation Planner
Engineering Division
Development Services Dept.
300 North Coast Highway
Oceanside, CA 92054

VIA ELECTRONIC MAIL
jamberson@ci.oceanside.ca.us

RE: Formal Request for Tribal Consultation Pursuant to the California Environmental Quality Act (CEQA), Public Resources Code section 21080.3.1, subds. (b), (d) and (e) for the Coast Highway Corridor Study Project in Oceanside, CA (GPA 16-00001)

Dear Mr. Amberson:

This letter constitutes a formal request for tribal consultation under the provisions of the California Environmental Quality Act (CEQA) (Public Resources Code section 21080.3.1 subdivisions (b), (d) and (e)) for the mitigation of potential project impacts to tribal cultural resource for the above referenced project. The San Luis Rey Band of Mission Indians requested formal notice and information for all projects within your agency's geographical jurisdiction and received notification on May 24, 2016 regarding the above referenced project.

The San Luis Rey Band of Mission Indians requests consultation on the following topics checked below, which shall be included in consultation if requested (Public Resources Code section 21080.3.2, subd. (a)):

__X__ Alternatives to the project

__X__ Recommended mitigation measures

__X__ Significant effects of the project

The San Luis Rey Band of Mission Indians also requests consultation on the following discretionary topics checked below (Public Resources Code section 21080.3.2 (subd. (a):

__X__ Type of environmental review necessary

__X__ Significance of tribal cultural resources, including any regulations, policies or standards used by your agency to determine significance of tribal cultural resources

__X__ Significance of the project's impacts on tribal cultural resources

__X__ Project alternatives and/or appropriate measures for preservation or mitigation that we may recommend, including, but not limited to:

(1) Avoidance and preservation of the resources in place, pursuant to Public Resources Code section 21084.3, including, but not limited to, planning and construction to avoid the resources and protect the cultural and natural context, or planning greenspace, parks or other open space, to incorporate the resources with culturally appropriate protection and management criteria;

(2) Treating the resources with culturally appropriate dignity taking into account the tribal cultural values and meaning of the resources, including but not limited to the following:

a. Protecting the cultural character and integrity of the resource;
b. Protection the traditional use of the resource; and
c. Protecting the confidentiality of the resource.

(3) Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

(4) Protecting the resource.

Additionally, the San Luis Rey Band of Mission Indians requests to receive any cultural resources assessments or other assessments that have been completed on all or part of the project's potential "area of project effect" (APE), including, but not limited to:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:
   - A listing of any and all known cultural resources have already been recorded on or adjacent to the APE;
   - Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
   - If the probability is low, moderate, or high that cultural resources are located in the APE.
   - Whether the records search indicates a low, moderate or high probability that unrecorded cultural resources are located in the potential APE; and
   - If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:
   - Any report that may contain site forms, site significance, and suggested mitigation measures.

All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code Section 6254.10.

3. The results of any Sacred Lands File (SFL) check conducted through Native American Heritage Commission. The request form can be found at http://www.nahc.ca.gov/slf_request.html. USGS 7.5-minute quadrangle name, township, range, and section required for the search.

4. Any ethnographic studies conducted for any area including all or part of the potential APE; and

5. Any geotechnical reports regarding all or part of the potential APE.

We would like to remind your agency that CEQA Guidelines section 15126.4, subdivision (b)(3) states that preservation in place is the preferred manner of mitigating impacts to archaeological sites. Section 15126.4, subd. (b)(3) of the CEQA Guidelines has been interpreted by the California Court of Appeal to mean that "feasible preservation in place must be adopted to mitigate impacts to historical resources of an archaeological nature unless the lead agency determines that another form of mitigation is available and provides superior mitigation of impacts." *Madera Oversight Coalition v. County of Madera* (2011) 199 Cal.App.4th 48, disapproved on other grounds, *Neighbors for Smart Rail v. Exposition Metro Line Construction Authority* (2013) 57 Cal.4th 439.

The San Luis Rey Band of Mission Indians expects to begin consultation within 30 days of your receipt of this letter. Please contact the San Luis Rey Band of Mission Indians lead contact person identified in our previous request for notification.

Name: Cami Mojado
Title: Cultural Resources Manager
Address: 1889 Sunset Drive, Vista, CA 92081
Office Phone Number: 760-724-8505
Direct Cell Phone Number: 760-917-1736
Office Fax Number 760-724-2172
Email Address: cjmojado@slrmissionindians.org

Sincerely,



Merri Lopez-Keifer
Chief Legal Counsel
San Luis Rey Band of Mission Indians

Rincon Band of Luiseño Indians
Cultural Resources Department

1 West Tribal Road · Valley Center · CA 92082 · (760) 297-2635 · Fax: (760) 297-2639

June 23, 2016

John Amberson
Transportation Planner
Engineering Division
Development Services Department
City of Oceanside
300 North Coast Highway
Oceanside, CA 92054

RE: Invitation to Consult Pursuant to Assembly Bill (AB) 52 and Senate Bill (SB) 18 regarding the proposed Coast Highway Corridor Study (GPA16-00001) in the City of Oceanside, County of San Diego, California

Dear Mr. John Amberson:

This letter is written on behalf of the Rincon Band of Luiseno Indians. We have received your letter of May 24, 2016 regarding the above named project. The identified project location is within the historic Luiseno Territory, and it is also situated within Rincon's specific area of cultural interest. Embedded in the Luiseno Territory are Rincon's history, culture, and identity.

We have no new information regarding this project; however, the project is in our Traditional Use Area, and we believe there is the possibility of inadvertent cultural findings at the project location. Due to the extent of proposed ground disturbances for the project, we recommend a Native American Monitor be present for all ground disturbing activities.

We thank you for the opportunity to comment and to protect and preserve our Luiseno cultural heritage.

Sincerely,

Vincent Whipple
Cultural Resources Manager
Rincon Band of Luiseno Indians

Bo Mazzetti, Tribal Chairman | Stephanie Spencer, Vice Chairwoman | Steve Stallings, Council Member | Laurie E. Gonzalez, Council Member | Alfonso Kolb, Sr., Council Member

PALA TRIBAL HISTORIC PRESERVATION OFFICE

PMB 50, 35008 Pala Temecula Road
Pala, CA 92059
760-891-3510 Office | 760-742-3189 Fax

PALA THPO

June 16, 2016

John Amberson
City of Oceanside
300 North Coast Highway
Oceanside, CA 92054

Re: AB-52 Consultation: Coast Highway Corridor Study

Dear Mrs. Amberson:

The Pala Band of Mission Indians Tribal Historic Preservation Office has received your notification of the project referenced above. This letter constitutes our response on behalf of Robert Smith, Tribal Chairman.

We have consulted our maps and determined that the project as described is not within the boundaries of the recognized Pala Indian Reservation. It is, however, within the boundaries of the territory that the tribe considers its Traditional Use Area (TUA) or it is situated in close proximity to the Reservation and information generated would likely be useful in better understanding regional culture and history. Therefore, we would like to initiate AB-52 consultation at this time.

We appreciate involvement with your initiative and look forward to working with you. If you have questions or need additional information, please do not hesitate to contact me by telephone at 760-891-3515 or by e-mail at sgaughen@palatribe.com.

Sincerely,

Shasta C. Gaughen, PhD
Tribal Historic Preservation Officer
Pala Band of Mission Indians

PECHANGA CULTURAL RESOURCES
Temecula Band of Luiseño Mission Indians

Post Office. Box 2183 • Temecula, CA 92593
Telephone (951) 308-9295 • Fax (951) 506-9491

Chairperson:
Neal Ibanez

Vice Chairperson:
Bridgett Barcello

Committee Members:
Mary Bear Magee
Evie Gerber
Darlene Miranda
Richard B. Scearce, III
Michael Vasquez

Director:
Gary DuBois

Coordinator:
Paul Macarro

Planning Specialist:
Tuba Ebru Ozdil

Cultural Analyst:
Anna Hoover

June 10, 2016

VIA E-MAIL and USPS

Scott Nightingale
Senior Planner
City of Oceanside
Development Services Department
Planning Division
300 North Coast Highway
Oceanside, CA 92054

Re: Pechanga Tribe Request for Consultation Pursuant to AB 52 for the Coast Highway Corridor

Dear Mr. Nightingale;

This letter is written on behalf of the Pechanga Band of Luiseño Indians (hereinafter, "the Tribe" and/or "Payómkawichum"), a federally recognized Indian tribe and sovereign government in response to the AB 52 notice provided by the City of Oceanside dated May 24, 2016 and received in our office June 1, 2016.

This letter serves as the Tribe's formal request to begin consultation under AB 52 for this Project. Per AB 52, we intend to assist the City of Oceanside in determining the type of environmental document that should be prepared for this Project (i.e. EIR, MND, ND); with identifying potential tribal cultural resources (TCRs); determining whether potential substantial adverse effects will occur to them; and to develop appropriate preservation, avoidance and/or mitigation measures, as appropriate. Preferred TCR mitigation is always avoidance and the Tribe requests that all efforts to preserve sensitive TCRs be made as early in the development process as possible.

Please add the Tribe to your distribution list(s) for public notices and circulation of all documents, including environmental review documents, archaeological reports, development plans, conceptual grading plans (if available), and all other applicable documents pertaining to this Project. The Tribe further requests to be directly notified of all public hearings and scheduled approvals concerning this Project, and that these comments be incorporated into the record of approval for this Project.

The Pechanga Tribe asserts that the Project area is part of Payómkawichum (Luiseño), and therefore the Tribe's, aboriginal territory as evidenced by the existence of Payómkawichum cultural resources, named places, *tóota yixélval* (rock art, pictographs, petroglyphs), and an extensive Payómkawichum artifact record in the vicinity of the Project. This culturally sensitive area is affiliated with the Pechanga Band of Luiseño Indians because of the Tribe's cultural ties to this area as well as our extensive history with the City of Oceanside and other projects within the area. During our consultation we will provide more specific, confidential information on potential TCRs that may be impacted by the proposed Project.

As you know, the AB 52 consultation process is ongoing and continues until appropriate mitigation has been agreed upon for the TCRs that may be impacted by the Project. As such, under both AB 52 and CEQA, we look forward to working closely with the City of Oceansideon ensuring that a full, comprehensive environmental review of the Project's impacts is completed, including addressing the culturally appropriate and respectful treatment of human remains and inadvertent discoveries.

In addition to those rights granted to the Tribe under AB 52, the Tribe reserves the right to fully participate in the environmental review process, as well as to provide further comment on the Project's impacts to cultural resources and potential mitigation for such impacts.

The Pechanga Tribe looks forward to working together with the City of Oceanside in protecting the invaluable Pechanga cultural resources found in the Project area. The formal contact person for this Project will be Anna Hoover. Please contact her at 951-770-8104 or at ahoover@pechanga-nsn.gov within 30 days of receiving these comments so that we can begin the consultation process. Thank you.

Sincerely,

Anna Hoover
Cultural Analyst

Cc Pechanga Office of the General Counsel

PECHANGA CULTURAL RESOURCES
Temecula Band of Luiseño Mission Indians

Post Office. Box 2183 • Temecula, CA 92593
Telephone (951) 308-9295 • Fax (951) 506-9491

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Neal Ibanez

Vice Chairperson:
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Committee Members:
Mary Bear Magee
Evie Gerber
Darlene Miranda
Richard B. Scearce, III
Michael Vasquez

Director:
Gary DuBois

Coordinator:
Paul Macarro

Planning Specialist:
Tuba Ebru Ozdil

Cultural Analyst:
Anna Hoover

June 14, 2016

VIA E-MAIL and USPS

Scott Nightingale
Senior Planner
City of Oceanside
Development Services Department
Planning Division
300 North Coast Highway
Oceanside, CA 92054

Re: Pechanga Tribe Request for Consultation Pursuant to SB 18 for the Coast Highway Corridor Study (GPA 16-00001)

Dear Mr. Nightingale:

This letter is written on behalf of the Pechanga Band of Luiseño Indians (hereinafter, "the Tribe"), a federally recognized Indian tribe and sovereign government in response to the SB 18 notice provided by City of Carlsbad, dated May 24, 2016. This letter serves as the Tribe's formal request for consultation under SB 18 for this Project. At this time, we do not have sufficient information to engage in meaningful consultation, as required by SB 18. As such, the Tribe hereby invokes its right to consult with City of Carlsbad under SB 18 and after reviewing the information requested below, we may request additional consultation, which may include a face-to-face meeting.

Further, the Tribe formally requests, pursuant to Public Resources Code §21092.2, to be notified and involved in the entire CEQA environmental review process for the duration of the above referenced project (the "Project"). Please add the Tribe to your distribution list(s) for public notices and circulation of all documents, including environmental review documents, archeological reports, and all documents pertaining to this Project. The Tribe further requests to be directly notified of all public hearings and scheduled approvals concerning this Project. Please also incorporate these comments into the record of approval for this Project.

The Pechanga Tribe asserts that the Project area is part of Luiseño, and therefore the Tribe's, aboriginal territory as evidenced by the existence of Luiseño place names, *tóota yixélval* (rock art, pictographs, petroglyphs), and an extensive Luiseño artifact record in the vicinity of the Project. This culturally sensitive area is affiliated with the Pechanga Band of Luiseño Indians because of the Tribe's cultural ties to this area as well as extensive history with both this Project and other projects within the area.

The Tribe has not received Archeological report, geotechnical report, site plans, preliminary grading plans, initial study or environmental reports for this Project. Please provide us copies of all available reports, and plans as soon as possible so that we may review them prior to our initial SB 18 meeting.

As you know, the SB 18 consultation process is ongoing and continues for the duration of the Project. As such, under both CEQA and SB 18 we look forward to working closely with City of Carlsbad on ensuring that a full, comprehensive environmental review of the Project's impacts is completed. Further, we hope to assist the City of Carlsbad with ensuring that the Project is designed to avoid impacts to cultural resources, as mandated by CEQA, in addition to developing mitigation measures addressing the culturally appropriate and respectful treatment of human remains, cultural resources and inadvertent discoveries.

In addition to those rights granted to the Tribe under SB 18, the Tribe reserves the right to fully participate in the environmental review process, as well as to provide further comment on the Project's impacts to cultural resources and potential mitigation for such impacts. Further, the Tribe reserves the right to participate in the regulatory process and provide comment on issues pertaining to the regulatory process and Project.

The Pechanga Tribe looks forward to working together with the City of Carlsbad in protecting the invaluable Pechanga cultural resources found in the Project area. Please contact me at 951-770-8104 or at ahoover@pechanga-nsn.gov once you have had a chance to review these comments so that we might address the issues concerning the mitigation language. Thank you.

Sincerely,

Anna Hoover
Cultural Analyst

Cc: Pechanga Office of the General Counsel

Appendix F1

Supplemental Noise and Vibration Technical Memo

ESA

ESA

550 West C Street
Suite 750
San Diego, CA 92101
619.719.4200 phone
619.719.4201 fax

www.esassoc.com

memorandum

date	October 10, 2018
to	City of Oceanside, Engineering Division
from	Jeff Goodson, ESA Kyle Kim, ESA
subject	Coast Highway Corridor Study – Supplemental Noise and Vibration Technical Memorandum

Introduction

In January 2017, Environmental Science Associates (ESA) evaluated the potential noise and vibration effects of the City of Oceanside Coast Highway Corridor Project (proposed project, or project), as presented in the Final City of Oceanside Coast Highway Corridor Project Noise and Vibration Study Technical Report (hereinafter referred to as the 2017 Noise Report) (ESA 2017). The 2017 Noise Report was prepared using traffic volumes provided in the project's Traffic Impact Analysis (TIA) for the Coast Highway Corridor Study, prepared by IBI Group (January 2017). The 2017 Noise Report provided the basis for the noise section included in the Draft Environmental Impact Report (EIR) prepared for the project, both of which were circulated as components of the Draft EIR in July/August in 2017.

Based on comments received from the California Department of Transportation (Caltrans) during the public review period for the Draft EIR, it was identified that the 2017 TIA did not analyze potential project impacts to the six Caltrans-controlled Interstate (I) 5 interchanges (listed below) and evaluated the proposed project's roadway system assuming the buildout of the Vista Way/State Route (SR) 78 & Interstate (I) 5 Project, which included high-occupancy vehicle (HOV) lanes and ramps. Caltrans noted that the traffic modeling conducted for the 2017 TIA incorrectly assumed that improvements to the interchanges with I-5 would be built and operational in the future traffic scenarios. Caltrans stated that, to ensure the most conservative analysis of project impacts, the future traffic scenarios should be remodeled to not include those improvements in the future traffic scenarios. While this is currently in Caltrans' and the region's long-term plans, funding is not guaranteed with enough certainty to include the improvements in a California Environmental Quality Act (CEQA)-required future analysis scenario. In addition, Caltrans also requested that additional roadway segments be included in the traffic modeling and analysis (all listed below). In August 2018, IBI finalized a revised TIA for the proposed project, which remodeled the proposed project without the above-identified freeway improvements and added the new roadway segments.

To consider the implications of these revisions and refinements to the TIA, this technical memorandum has been prepared to supplement the traffic noise analysis of the 2017 Noise Report. Changes to the traffic volumes of the previous and new roadway segments are included in Appendix A of the revised TIA.

Comparison of the Revised TIA to the 2017 TIA

As stated above, the revised TIA remodeled the proposed project for existing and future conditions based on the changes requested by Caltrans, which removed future improvements to the buildout of the Vista Way/SR 78/I-5 on-/off-ramps and added 11 new roadway segments in addition to the roadway segments included in the 2017 TIA. The 11 new roadway segments included in the revised TIA consist of the following:

- Vandergrift Boulevard, north of San Rafael Drive
- Vandergrift Boulevard, south of San Rafael Drive
- SR 76, west of I-5 Southbound On-Ramp
- SR 76, east of I-5 Southbound On-Ramp
- Mission Avenue, west of I-5 Southbound Off-Ramp
- Mission Avenue, east of I-5 Southbound Off-Ramp
- Oceanside Boulevard, west of I-5 Southbound On-/Off-Ramp
- Oceanside Boulevard, east of I-5 Northbound On-/Off-Ramp
- California Street, west of Soto Street/I-5 Northbound On-Ramp
- Cassidy St, east of I-5 Southbound On-Ramp/I-5 Southbound Off-Ramp
- Vista Way, west of I-5 Southbound On-/Off-Ramp

In addition, ESA noise specialists reviewed the revised TIA to determine what changes occurred to the traffic volumes on the roadways segments. The traffic volumes for all roadway segments analyzed in 2017 changed under the remodeled conditions in the revised TIA.

Supplemental Analysis Approach

As the traffic volumes for the roadway segments in the 2017 TIA changed as a result of the remodeling conducted for the revised TIA, the traffic noise levels estimated for those roadway segments also would be expected to change. As such, it was determined that the noise modeling for all of the study area roadway segments needed to be updated. As detailed in the 2017 Noise Report, doubling or halving a noise source, such as traffic volumes, results in only a 3 dBA change. Therefore, although the traffic volumes of each roadway segment may have changed to some degree (increases or decreases), the net change may or may not be substantial enough to result in a new traffic noise level that would exceed the noise threshold. As such, this supplemental noise analysis reflects the new traffic noise levels and identifies any roadway segments where increases in the traffic noise level would exceed the noise significance threshold.

This supplemental noise analysis considers the traffic noise levels with the project under both the Future (2035) with Project and Future (2035) Cumulative traffic scenarios.

Supplemental Noise Analysis

This technical memorandum is consistent with the format and numbering system of the 2017 Noise Report, and only supplements and revises the applicable portions of the associated sections, shown below, of the 2017 Noise Report based on the revised TIA. All other sections of the 2017 Noise Report have not been revised and remain applicable to the proposed project. The following sections of the 2017 Noise Report have been revised to be consistent with the revised TIA.

3.6 Existing Conditions

In the 2017 Noise Report, Section 3.6, *Existing Conditions*, Table 2, *Existing Roadway Noise Levels*, provided the existing traffic noise levels calculated for the project roadway segments of the 2017 TIA based on the existing traffic volumes provided in the 2017 TIA (IBI 2017). The existing traffic noise levels were calculated for comparison to the Future (2035) traffic noise levels to determine the cumulative traffic noise impacts (Section 4.4).

Table 2 (revised) provides the existing traffic noise levels of the project roadways of the revised TIA (IBI 2018), which includes the addition of the 11 new roadway segments (Vandergrift Boulevard through Vista Way, West of I-5 SB On-/Off-Ramp).

TABLE 2 (REVISED)
EXISTING ROADWAY NOISE LEVELS

Roadway Segment	Existing Land Uses Located Along Roadway Segment	dBA CNEL[a]
Coast Highway		
Between SR 76 Ramps and Surfrider Way	Commercial	68.2
Between Surfrider Way and Civic Center Drive	Residential/Commercial	66.3
Between Civic Center Drive and Pier View Way	Commercial	66.3
Between Pier View Way and Mission Way	Commercial	66.0
Between Mission Way and Seagaze Street	Commercial	66.4
Between Seagaze Street and Missouri Avenue	Residential/Commercial	66.7
Between Missouri Avenue and Washington Avenue	Commercial	66.5
Between Washington Avenue and Wisconsin Avenue	Residential/Commercial	66.5
Between Wisconsin Avenue and Oceanside Boulevard	Commercial	67.3
Between Oceanside Boulevard Morse Street	Residential/Commercial	67.4
Between Morse Street and Cassidy Street	Commercial	66.9
Between Cassidy Street and Vista Way	Lodge/Commercial	67.5
Between Vista Way and Eaton Street	Commercial	67.0
Vista Way		
Between Broadway Street and Coast Highway	Residential/Commercial	60.5
Between Coast Highway and Ditmar Street	Residential/Commercial	67.3
Cassidy Street		
Between Broadway Street and Tremont Street	Residential/Commercial	61.9

TABLE 2 (REVISED)
EXISTING ROADWAY NOISE LEVELS

Roadway Segment	Existing Land Uses Located Along Roadway Segment	dBA CNEL[a]
Between Tremont Street and Coast Highway	Residential/Commercial	63.0
Between Coast Highway and Freeman Street	Residential/Commercial	62.2
Between Freeman Street and Ditmar Street	Residential/Commercial	62.0
Morse Street		
Between Coast Highway and Freeman Street	Commercial	60.2
Between Freeman Street and Ditmar Street	Residential/Commercial	57.3
Oceanside Boulevard		
Between Tremont Street and Coast Highway	Commercial	62.9
Between Coast Highway and Ditmar Street	School/Commercial	68.4
Wisconsin Avenue		
Between Tremont Street and Coast Highway	Commercial	63.3
Between Coast Highway and Freeman Street	Residential/Commercial	59.9
Between Freeman Street and Ditmar Street	Residential/Commercial	59.9
Washington Avenue		
West of Coast Highway	Commercial	53.3
East of Coast Highway	Residential/Commercial	53.0
Missouri Avenue		
West of Coast Highway	Commercial	55.4
East of Coast Highway	Residential/Commercial	53.2
Michigan Avenue		
West of Coast Highway	Commercial	60.2
East of Coast Highway	Residential/Commercial	57.6
Seagaze Street		
Between Tremont Street and Coast Highway	Commercial	63.9
Between Coast Highway and Freeman Street	Commercial	64.5
Between Freeman Street and Ditmar Street	Commercial	64.5
Mission Avenue		
Between Cleveland Street and Coast Highway	Commercial	63.1
Between Coast Highway and Horne Street	Commercial	64.0
Pier View Way		
West of Coast Highway	Commercial	59.8
Between Coast Highway and Horne Street	Commercial	58.8
Civic Center Drive		
West of Coast Highway	Residential/Commercial	57.8
East of Coast Highway	Residential/Commercial	59.8
Surfrider Way		
West of Coast Highway	Residential/Commercial	62.8
East of Coast Highway	Residential/Commercial	58.8
Vandergrift Boulevard		
North of San Rafael Drive	Residential/Vacant Land	71.7

TABLE 2 (REVISED)
EXISTING ROADWAY NOISE LEVELS

Roadway Segment	Existing Land Uses Located Along Roadway Segment	dBA CNEL[a]
South of San Rafael Drive	Family Care	71.6
State Route 76		
West of I-5 SB On-Ramp	Lodging/Commercial	71.1
East of I-5 SB On-Ramp	Residential/Vacant Land	72.1
Mission Avenue		
West of I-5 SB Off-Ramp	School/Commercial	72.0
East of I-5 SB Off-Ramp	Lodging/Commercial	70.6
Oceanside Boulevard		
West of I-5 SB On-/Off-Ramp	Lodging/Residential/Commercial	70.6
East of I-5 NB On-/Off-Ramp	Commercial	70.6
California Street		
West of Soto Street/I-5 NB On-Ramp	Residential	62.1
Cassidy Street		
East of I-5 SB On-Ramp/I-5 SB Off-Ramp	Residential	64.3
Vista Way		
West of I-5 SB On-/Off-Ramp	Residential	73.0

[a] Based on noise levels at 25 feet distance from the roadway and residential uses if residential uses are shown along roadways.

SOURCE: ESA 2018

4.3 Project Impacts

Issue 3: Would implementation of the proposed project result in a substantial permanent increase in ambient noise levels in the project area above levels existing without the proposed project?

Future (2035) Traffic Conditions

In the 2017 Noise Report, Section 4.3, *Project Impacts*, Future (2035) Traffic Conditions, Table 9, *Off-site Traffic Noise Impacts – Future (2035) with Project Conditions*, compared the future traffic noise levels with and without the project to identify the incremental increases for the roadway segments provided in the 2017 TIA, and whether the increases exceed the threshold of a 5 dBA Community Noise Equivalent Level (CNEL) increase.

For the revised TIA, Table 9 (revised) compares the future traffic noise levels with and without the project to identify the incremental increase for the roadway segments provided in the revised TIA, which includes the same segments in the 2017 Noise Report plus the 11 new roadway segments (Vandergrift Boulevard through Vista Way, West of I-5 SB On-/Off-Ramp).

TABLE 9 (REVISED)
OFF-SITE TRAFFIC NOISE IMPACTS – FUTURE (2035) WITH PROJECT CONDITIONS

Roadway Segment	Calculated Traffic Noise Levels at 25 Feet from Roadway CNEL (dBA)			
	Future without Project (A)	Future with Project (B)	Project Increment (B-A)	Exceed Threshold?
Coast Highway				
Between SR 76 Ramps and Surfrider Way	67.7	70.2	2.5	No
Between Surfrider Way and Civic Center Drive	64.2	68.3	4.1	No
Between Civic Center Drive and Pier View Way	64.7	68.4	3.7	No
Between Pier View Way and Mission Way	64.8	68.2	3.4	No
Between Mission Way and Seagaze Street	65.8	68.2	2.4	No
Between Seagaze Street and Missouri Avenue	64.5	67.0	2.5	No
Between Missouri Avenue and Washington Avenue	63.9	66.8	2.9	No
Between Washington Avenue and Wisconsin Avenue	63.7	67.1	3.4	No
Between Wisconsin Avenue and Oceanside Boulevard	65.8	68.3	2.5	No
Between Oceanside Boulevard and Morse Street	67.1	69.0	1.9	No
Between Morse Street and Cassidy Street	65.8	68.6	2.8	No
Between Cassidy Street and Vista Way	66.9	69.1	2.2	No
Between Vista Way and Eaton Street	67.2	69.0	1.8	No
North of West Street	61.7	64.3	2.6	No
South of West Street	61.4	64.3	2.9	No
North of Kelly Street	61.8	66.3	4.5	No
South of Kelly Street	61.3	64.5	3.2	No
Vista Way				
Between Broadway Street and Coast Highway	63.6	62.3	-1.3	No
Between Coast Highway and Ditmar Street	69.6	68.7	-0.9	No
Cassidy Street				
Between Broadway Street and Tremont Street	65.2	62.8	-2.4	No
Between Tremont Street and Coast Highway	62.8	64.4	1.6	No
Between Coast Highway and Freeman Street	60.8	63.8	3.0	No
Between Freeman Street and Ditmar Street	60.2	60.2	0.0	No
Morse Street				
Between Coast Highway and Freeman Street	65.2	63.9	-1.3	No
Between Freeman Street and Ditmar Street	62.0	61.4	-0.6	No
Oceanside Boulevard				
Between Tremont Street and Coast Highway	63.9	64.4	0.5	No
Between Coast Highway and Ditmar Street	67.7	68.7	1.0	No
Wisconsin Avenue				
Between Tremont Street and Coast Highway	64.2	65.3	1.1	No
Between Coast Highway and Freeman Street	63.2	63.0	-0.2	No
Between Freeman Street and Ditmar Street	65.2	65.0	-0.2	No
Washington Avenue				
West of Coast Highway	56.1	59.0	2.9	No
East of Coast Highway	53.0	56.5	3.5	No
Missouri Avenue				
West of Coast Highway	58.2	54.6	-3.6	No
East of Coast Highway	55.5	55.8	0.3	No

TABLE 9 (REVISED)
OFF-SITE TRAFFIC NOISE IMPACTS – FUTURE (2035) WITH PROJECT CONDITIONS

Roadway Segment	Calculated Traffic Noise Levels at 25 Feet from Roadway CNEL (dBA)			
	Future without Project (A)	Future with Project (B)	Project Increment (B-A)	Exceed Threshold?
Michigan Avenue				
West of Coast Highway	57.1	61.2	4.1	No
East of Coast Highway	54.5	59.6	5.1	**Yes**
Seagaze Street				
Between Tremont Street and Coast Highway	65.9	66.1	0.2	No
Between Coast Highway and Freeman Street	63.2	63.0	-0.2	No
Between Freeman Street and Ditmar Street	66.2	66.8	0.6	No
Mission Avenue				
Between Cleveland Street and Coast Highway	65.2	64.9	-0.3	No
Between Coast Highway and Horne Street	65.2	64.5	-0.7	No
Pier View Way				
West of Coast Highway	61.1	62.0	0.9	No
Between Coast Highway and Horne Street	60.5	55.1	-5.4	No
Civic Center Drive				
West of Coast Highway	59.3	60.9	1.6	No
East of Coast Highway	59.7	60.7	1.0	No
Surfrider Way				
West of Coast Highway	62.1	64.7	2.6	No
East of Coast Highway	59.5	61.5	2.0	No
Vandergrift Boulevard				
North of San Rafael Drive	72.4	72.4	0.0	No
South of San Rafael Drive	72.3	72.3	0.0	No
State Route 76				
West of I-5 SB On-Ramp	72.0	72.7	0.7	No
East of I-5 SB On-Ramp	73.3	73.5	0.2	No
Mission Avenue				
West of I-5 SB Off-Ramp	69.2	68.9	-0.3	No
East of I-5 SB Off-Ramp	68.5	68.1	-0.4	No
Oceanside Boulevard				
West of I-5 SB On-/Off-Ramp	70.2	70.3	0.1	No
East of I-5 NB On-/Off-Ramp	71.0	71.1	0.1	No
California Street				
West of Soto Street/I-5 NB On-Ramp	59.2	59.2	0.0	No
Cassidy Street				
East of I-5 SB On-Ramp/I-5 SB Off-Ramp	61.1	61.1	0.0	No
Vista Way				
West of I-5 SB On-/Off-Ramp	72.3	72.5	0.2	No

[a] Based on noise levels at 25 feet distance from the roadway and residential uses if residential uses are shown along roadways.

SOURCE: ESA 2018

In the 2017 Noise Report, the roadway segment of Wisconsin Avenue between Freeman Street and Ditmar Street was identified as exceeding the noise increase threshold with implementation of the project, which would result in a significant and unavoidable impact. As shown in Table 9 (revised), with the new modeling conducted for the revised TIA, the traffic noise increase for this roadway segment was determined to no longer exceed the noise increase threshold. However, the revised TIA did identify that the roadway segment of Michigan Avenue, east of Coast Highway, would exceed the noise increase threshold. In this location, the increase in traffic noise compared to Future (2035) without Project condition is estimated to be 5.1 dBA CNEL, which is greater than the significance threshold of a 5 dBA CNEL increase. Therefore, a significant noise impact would occur along the roadway segment of Michigan Avenue, east of Coast Highway. All other roadway segments analyzed would experience noise increases lower than the 5 dBA CNEL threshold in the revised TIA; therefore, impacts to these roadway segments would be less than significant.

Because of the configuration of existing land uses along Michigan Avenue, east of Coast Highway, the significant traffic noise impact cannot be mitigated as vehicles traveling on this roadway segment access driveways of existing residential and commercial uses along this roadway segment. Thus, the addition of sound walls or other noise attenuation approaches along this roadway segment are not feasible in this location. Therefore, as determined in the 2017 Noise Report, implementation of the project would result in a ***significant and unavoidable*** traffic noise impact, though this impact would occur along a different roadway segment than stated in the 2017 Noise Report.

4.4 Cumulative Impacts

Table 10 (revised) compares the Future (2035) with Project traffic noise levels to existing traffic noise levels for all roadway segments in the revised TIA, including the 11 new roadway segments (Vandergrift Boulevard through Vista Way, West of I-5 SB On-/Off-Ramp).

TABLE 10 (REVISED)
TRAFFIC NOISE IMPACTS – FUTURE (2035) CUMULATIVE INCREMENT

	Calculated Traffic Noise Levels at 25 Feet from Roadway CNEL (dBA)			
Roadway Segment	**Existing (A)**	**Future with Project (B)**	**Cumulative Increment (B-A)**	**Exceed Threshold?**
Coast Highway				
Between SR 76 Ramps and Surfrider Way	68.2	70.2	2.0	No
Between Surfrider Way and Civic Center Drive	66.3	68.3	2.0	No
Between Civic Center Drive and Pier View Way	66.3	68.4	2.1	No
Between Pier View Way and Mission Way	66.0	68.2	2.2	No
Between Mission Way and Seagaze Street	66.4	68.2	1.8	No
Between Seagaze Street and Missouri Avenue	66.7	67.0	0.3	No
Between Missouri Avenue and Washington Avenue	66.5	66.8	0.3	No
Between Washington Avenue and Wisconsin Avenue	66.5	67.1	0.6	No
Between Wisconsin Avenue and Oceanside Boulevard	67.3	68.3	1.0	No
Between Oceanside Boulevard and Morse Street	67.4	69.0	1.6	No

TABLE 10 (REVISED)
TRAFFIC NOISE IMPACTS – FUTURE (2035) CUMULATIVE INCREMENT

Roadway Segment	Calculated Traffic Noise Levels at 25 Feet from Roadway CNEL (dBA)			
	Existing (A)	Future with Project (B)	Cumulative Increment (B-A)	Exceed Threshold?
Between Morse Street and Cassidy Street	66.9	68.6	1.7	No
Between Cassidy Street and Vista Way	67.5	69.1	1.6	No
Between Vista Way and Eaton Street	67.0	69.0	2.0	No
Vista Way				
Between Broadway Street and Coast Highway	60.5	62.3	1.8	No
Between Coast Highway and Ditmar Street	67.3	68.7	1.4	No
Cassidy Street				
Between Broadway Street and Tremont Street	61.9	62.8	0.9	No
Between Tremont Street and Coast Highway	63.0	64.4	1.4	No
Between Coast Highway and Freeman Street	62.2	63.8	1.6	No
Between Freeman Street and Ditmar Street	62.0	60.2	-1.8	No
Morse Street				
Between Coast Highway and Freeman Street	60.2	63.9	3.7	No
Between Freeman Street and Ditmar Street	57.3	61.4	4.1	No
Oceanside Boulevard				
Between Tremont Street and Coast Highway	62.9	64.4	1.5	No
Between Coast Highway and Ditmar Street	68.4	68.7	0.3	No
Wisconsin Avenue				
Between Tremont Street and Coast Highway	63.3	65.3	2.0	No
Between Coast Highway and Freeman Street	59.9	63.0	3.1	No
Between Freeman Street and Ditmar Street	59.9	65.0	5.1	**Yes**
Washington Avenue				
West of Coast Highway	53.3	59.0	5.7	**Yes**
East of Coast Highway	53.0	56.5	3.5	No
Missouri Avenue				
West of Coast Highway	55.4	54.6	-0.8	No
East of Coast Highway	53.2	55.8	2.6	No
Michigan Avenue				
West of Coast Highway	60.2	61.2	1.0	No
East of Coast Highway	57.6	59.6	2.0	No
Seagaze Street				
Between Tremont Street and Coast Highway	63.9	66.1	2.2	No
Between Coast Highway and Freeman Street	64.5	63.0	-1.5	No
Between Freeman Street and Ditmar Street	64.5	66.8	2.3	No
Mission Avenue				
Between Cleveland Street and Coast Highway	63.1	64.9	1.8	No
Between Coast Highway and Horne Street	64.0	64.5	0.5	No
Pier View Way				
West of Coast Highway	59.8	62.0	2.2	No
Between Coast Highway and Horne Street	58.8	55.1	-3.7	No

TABLE 10 (REVISED)
TRAFFIC NOISE IMPACTS – FUTURE (2035) CUMULATIVE INCREMENT

Roadway Segment	Calculated Traffic Noise Levels at 25 Feet from Roadway CNEL (dBA)			
	Existing (A)	Future with Project (B)	Cumulative Increment (B-A)	Exceed Threshold?
Civic Center Drive				
West of Coast Highway	57.8	60.9	3.1	No
East of Coast Highway	59.8	60.7	0.9	No
Surfrider Way				
West of Coast Highway	62.8	64.7	1.9	No
East of Coast Highway	58.8	61.5	2.7	No
Vandergrift Boulevard				
North of San Rafael Drive	71.7	72.4	0.7	No
South of San Rafael Drive	71.6	72.3	0.7	No
State Route 76				
West of I-5 SB On-Ramp	71.1	72.7	1.6	No
East of I-5 SB On-Ramp	72.1	73.5	1.4	No
Mission Avenue				
West of I-5 SB Off-Ramp	72.0	68.9	-3.1	No
East of I-5 SB Off-Ramp	70.6	68.1	-2.5	No
Oceanside Boulevard				
West of I-5 SB On-/Off-Ramp	70.6	70.3	-0.3	No
East of I-5 NB On-/Off-Ramp	70.6	71.1	0.5	No
California Street				
West of Soto Street/I-5 NB On-Ramp	62.1	59.2	-2.9	No
Cassidy Street				
East of I-5 SB On-Ramp/I-5 SB Off-Ramp	64.3	61.1	-3.2	No
Vista Way				
West of I-5 SB On-/Off-Ramp	73.0	72.5	-0.5	No

[a] Based on noise levels at 25 feet distance from the roadway and residential uses if residential uses are shown along roadways.

SOURCE: ESA 2018

In the 2017 Noise Report, the roadway segments of Wisconsin Avenue, between Freeman Street and Ditmar Street, and Washington Avenue, west of Coast Highway, were identified as exceeding the noise increase threshold with implementation of the project, which was identified as a significant and unavoidable impact. As shown in Table 10 (revised), with the new modeling conducted for the revised TIA, these roadway segments would still result in a traffic noise increase that exceeds the significance threshold of a 5 dBA CNEL increase in the Future (2035) Cumulative scenario. Therefore, significant noise impacts would still occur along these two roadway segments.

For all of the other roadway segments in Table 10 (revised), the potential cumulative incremental increase in project-related future traffic noise levels over the future traffic noise levels without the project would be minimal,

and would not exceed the significance threshold of a 5 dBA CNEL increase. For some segments, the change would be a decrease in traffic noise levels. Therefore, impacts would be less than significant for these other roadway segments.

Because of the configuration of land uses along Wisconsin Avenue, between Freeman Street and Ditmar Street, and Washington Avenue, west of Coast Highway, the significant traffic noise impacts cannot be mitigated as vehicles traveling on these roadway segments access driveways of existing residential and commercial uses along these roadway segments. Thus, the addition of sound walls or other noise attenuation approaches along these roadway segments are not feasible. As such, as determined in the 2017 Noise Report, the traffic noise impacts would remain ***significant and unavoidable*** in the Future (2035) Cumulative scenario.

Appendix F2

Noise and Vibration Technical Report

ESA

Final

City of Oceanside Coast Highway Corridor Study Project

Noise and Vibration Study Technical Report

Prepared for
City of Oceanside

January 2017

ESA

Final

City of Oceanside Coast Highway Corridor Study Project

Noise and Vibration Study Technical Report

Prepared for
City of Oceanside

January 2017

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City of Oceanside Coast Highway Corridor Project

Noise and Vibration Study Technical Report

1. Introduction

This technical report addresses the potential noise and vibration impacts associated with the proposed Coast Highway Corridor Study Project (proposed project, or project). The project is composed of two major components: (1) the Complete Streets improvements, and (2) the Coast Highway Incentive District (hereinafter referred to as the Incentive District). The project is located primarily along the project segment of the Coast Highway Corridor and extends into the adjacent neighborhoods, all within the City of Oceanside, California. The project corridor consists of and is adjacent to a variety of land uses, including primarily commercial and retail along Coast Highway, with surrounding residential, primarily one block (east and west) off of the Coast Highway corridor. It should be noted that when referring specifically to each project component, the terms "Complete Streets improvements" and "Incentive District" will be used to describe the individual areas, while the term "project area" will be used when referring to the combined area of both project components.

This analysis describes the existing noise environment in the project area, identifies applicable noise regulations, and evaluates potential noise and vibration impacts associated with build-out of the Complete Streets improvements. Additionally, this technical report provides a programmatic (more general) analysis of the potential noise impacts associated with the potential future development and redevelopment that could result from the Incentive District. Where applicable, measures to mitigate or minimize noise impacts associated with the project are included.

Information used to prepare this analysis was obtained from the City of Oceanside General Plan Noise Element (City of Oceanside 2002), the project's Traffic Impact Analysis (TIA) for the Coast Highway Corridor Study prepared by IBI Group (January 2017), and other sources identified herein.

This technical report is being prepared to support the environmental review process for the project under the California Environmental Quality Act (CEQA). The City is the proponent and the lead agency for the project.

2. Project Description

This section describes the project components of the Complete Streets improvements and Incentive District. The Complete Streets improvements are specific improvements to be constructed within the existing Coast Highway corridor in the near-term. The creation of the

Incentive District would be based on the implementation of the Coast Highway Vision and Strategic Plan, amendments to the Zoning Ordinance for the Incentive District, and an amendment to the City's General Plan.

2.1 Complete Streets Improvements

The Coast Highway corridor currently operates with four travel lanes, two northbound and two southbound, with limited on-street parking and no designated bicycle facilities. The Complete Streets improvements would result in several changes to the Coast Highway corridor (**Figure 1**). The improvements would convert Coast Highway from four lanes to two lanes throughout the corridor, with segments of two southbound travel lanes between State Route 76 (SR-76) and Surfrider Way, and south of Kelly Street to Eaton Street. The improvements would also provide new traffic intersection roundabouts, new on-street parking, continuous bicycle facilities, and streetscape improvements within the corridor.

The improvements would include the phased installation of traffic roundabouts at 12 specific intersections, which are identified in the project TIA along the Coast Highway corridor and are currently either signalized or stop-sign controlled (Figure 1) (IBI 2017). The roundabouts would feature one lane in each direction with the exception of the roundabout proposed at SR-76 and Coast Highway, which would consist of two lanes in each direction. The 12 roundabouts are proposed along Coast Highway at the intersections with the following streets:

1. SR-76
2. Surfrider Way
3. Civic Center Drive
4. Pier View Way
5. Michigan Avenue
6. Washington Avenue
7. Wisconsin Avenue
8. West Street
9. Oceanside Boulevard
10. Morse Street
11. Cassidy Street
12. Kelly Street

All of these intersections are currently signalized, except for the intersections with Washington Avenue, West Street, and Kelly Street, which currently are stop-sign controlled (IBI 2017).

The improvements would also add dedicated two-way left-turn lanes within the street segments of Coast Highway between Harbor Drive and SR-76 and Pier View Way and Seagaze Drive. Dedicated middle two-way left-turn lanes would be added between SR-76 and Surfrider Way, Oceanside Boulevard and Morse Street, and Kelly Street and Vista Way. Street segments with improved raised medians without the ability to turn left would include Surfrider Way to Pier View Way, Seagaze Drive to Oceanside Boulevard, and Morse Street to Kelly Street. Additionally, the improvements would create continuous bicycle facilities throughout the Coast Highway corridor, starting at Harbor Drive and extending south past Eaton Street.



SOURCE: City of Oceanside 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 1

Project Area and Noise Measurement Locations

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Construction of the Complete Streets improvements is anticipated to begin in January 2018 and be completed by December 2035, potentially over approximately an 18-year period. Construction of the improvements would be implemented in multiple phases, with each phase anticipated to construct a maximum of two roundabouts. The exact construction plan and scheduling of the project has not been determined. In order to develop parameters for the noise analysis the City estimated a worst-case (most impactful) analysis scenario. Under this worst-case scenario, two roundabouts would be constructed simultaneously over a 4-month period, starting between January 2018 to April 2018 (i.e., phase one). A maximum of 20 haul truck trips per day were assumed to haul demolition debris (pavement removed for roundabouts) during the respective phases. Construction of the Complete Streets improvements would occur from 7:00 a.m. to 6:00 p.m. Monday through Saturday (i.e., daytime construction only, no evening or night construction). No construction would occur on Sundays.

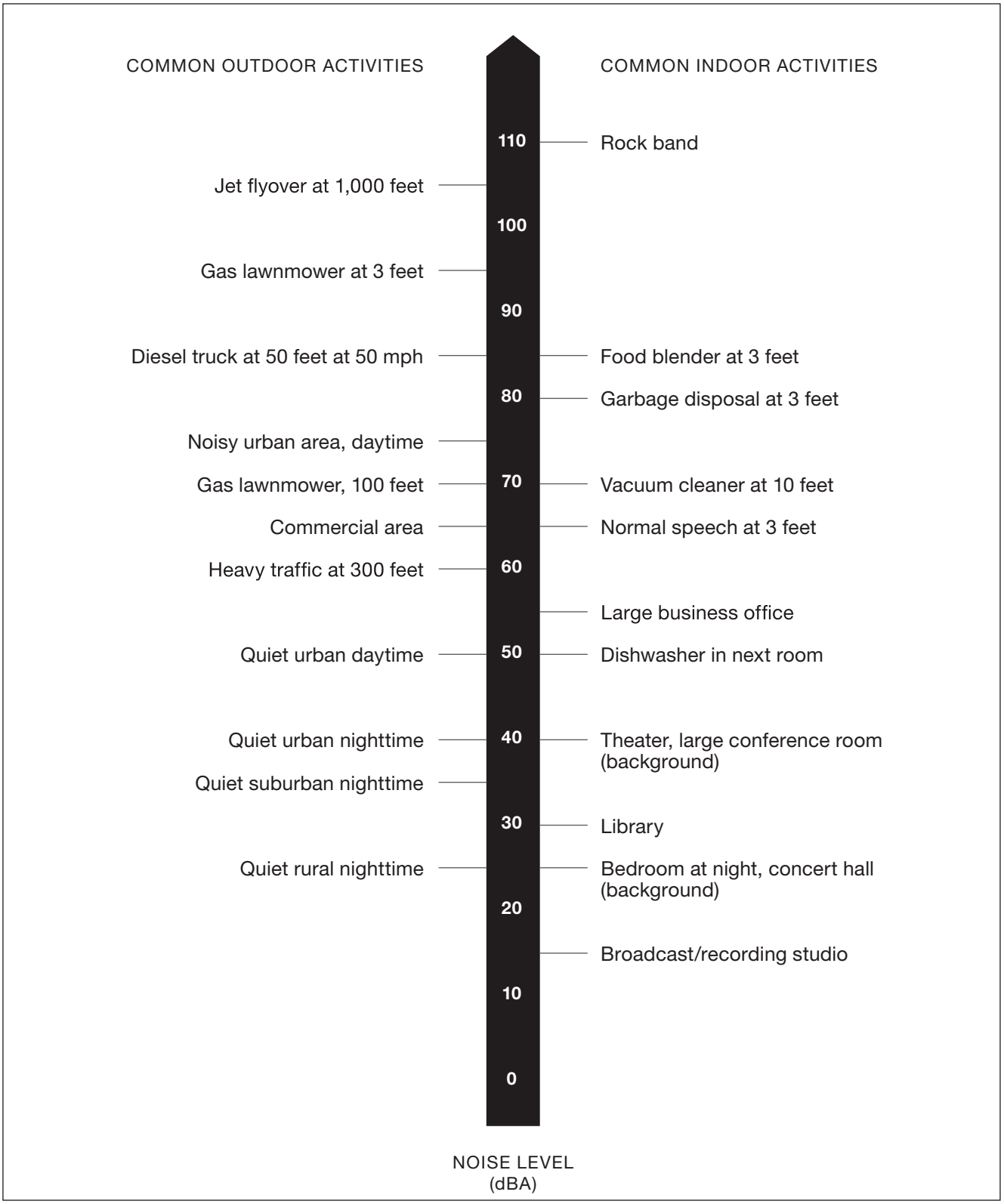
2.2 Incentive District

In addition to the Complete Streets improvements, the project would also include the Incentive District (Figure 1). The Incentive District would extend primarily along most of the Coast Highway corridor in an irregular shape from Seagaze Drive to the north, to just past Eaton Street to the south, and from as far as east as Ditmar Street, to as far west as Pacific Street (Figure 1). The Incentive District would provide optional regulations and standards which a developer or property owner may choose in lieu of the existing underlying zoning. If opted for, the Incentive District would apply to all new land uses, new or developed structures, subdivisions, and assemblages within the Incentive District area. Implementation of the Incentive District would require amendments to the City's existing General Plan and Zoning Ordinance. Since the future projects developed under the Incentive District are unknown at this time, a programmatic analysis of the Incentive District is presented within this report.

3. Environmental Setting

3.1 Noise Principles and Descriptors

The decibel (dB) is a conventional unit for measuring the amplitude of sound, as it accounts for the large variations in sound pressure amplitude, and reflects the way people perceive changes in sound. When describing sound and its effect on humans, A-weighted (dBA) sound levels are typically used to account for the response of the human ear. The term "A-weighted" refers to a filtering of the noise signal in a manner corresponding to the way the human ear perceives sound. Some representative common outdoor and indoor noise sources and their corresponding A-weighted noise levels are shown in **Figure 2**.



SOURCE: Caltrans

City of Oceanside Coast Highway Corridor Study Project

Figure 2

Decibel Scale and Common Noise Sources

ESA

3.2 Noise Exposure and Community Noise

The following noise descriptors are used to characterize environmental noise levels over time, which are applicable to the proposed project:

L_{eq}: The equivalent sound level over a specified period of time, typically, 1 hour (i.e., $L_{eq(1)}$). The L_{eq} is also referred to as the average sound level.

CNEL: The Community Noise Equivalent Level (CNEL) is the equivalent A-weighted noise level during a 24-hour day, that includes an addition of a 5 dB penalty to noise levels between the hours of 7:00 a.m. to 10:00 p.m., and an addition of 10 dB to noise levels between the hours of 10:00 p.m. to 7:00 a.m., to account for noise sensitivity in the evening and nighttime, respectively.

3.3 Effects of Noise on People

People judge the relative magnitude of sound sensation by subjective terms such as "loudness" or "noisiness." A change in sound level of 3 dB is considered "just perceptible," a change in sound level of 5 dB is considered "clearly noticeable," and a change of 10 dB is recognized as "twice as loud."

Because decibels are logarithm values, they cannot be combined by normal algebraic addition. For example, when the decibel values of two sources differ by 0 to 1 dB, combining them would add 3 dB to the higher level for the combined sound level. When the decibel levels of two sources differ by more than 1 dB, combining them would add between 0 to 3 dBA to the higher level, depending on the relative difference. At a difference of 10 dB or more, the higher noise source dominates, and there is no addition to the higher level source (i.e., there is no effective change in the overall decibel value with or without the addition of the lower noise level source).

3.4 Noise Attenuation

When noise propagates over a distance, the noise level reduces (i.e., attenuates) with distance, the degree to which depends on the type of noise source and the propagation path. Noise from a localized source (i.e., point source) propagates uniformly outward in a spherical pattern, referred to as "spherical spreading." Stationary point sources of noise, including stationary mobile sources, such as idling vehicles, attenuate at a rate of 6 dBA for acoustically "hard" sites and 7.5 dBA for acoustically "soft" sites, for each doubling of distance from the reference measurement, as their energy is continuously spread out over a spherical surface. Hard sites are those with a reflective surface between the source and the receiver, such as asphalt or concrete surfaces or smooth bodies of water. No attenuation from the ground surface is assumed for hard sites, and the 6 dBA reduction in noise levels with doubling of distance is only from the geometric spreading of the noise from the source (e.g., for hard sites, 80 dBA at 50 feet attenuates to 74 at 100 feet, 68 dBA at 200 feet). Soft sites are those with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees; in addition to the 6 dBA reduction from geometric spreading, soft sites provide an additional attenuation of up to 1.5 dBA per doubling distance from the surface. Typically, in an analysis, the given ground surface is somewhere in between a hard and soft site; therefore, for a conservative estimate, the hard site attenuation rate

of 6 dBA for point sources is typically used in analyses, rather than attempt to determine the exact surface conditions between each source and receptor.

Roadways and highways consist of several localized noise sources on a defined path, and hence, are treated as "line" sources, which approximate the effect of several point sources. Noise from a line source propagates over a cylindrical surface, often referred to as "cylindrical spreading." Line sources (e.g., traffic noise from vehicles) attenuate at a rate of between 3 dBA for hard sites and 4.5 dBA for soft sites for each doubling of distance from the reference measurement. Therefore, noise due to a line source attenuates less (about half) with distance than that of a point source.

3.5 Fundamentals of Vibration

Vibration is an oscillatory motion through a solid medium in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. The response of humans, buildings, and equipment to vibration is more accurately described using velocity or acceleration. Vibration amplitudes are usually described in terms of peak levels, as in peak particle velocity (PPV). The peak level represents the maximum instantaneous peak of the vibration signal. In addition, vibrations can be measured in the vertical, horizontal longitudinal, or horizontal transverse directions. Ground vibrations are most often greatest, and can damage buildings, when they propagate in the vertical direction. Therefore, the analysis of ground-borne vibration associated with the proposed project was evaluated in the vertical direction. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Man-made vibration issues are, therefore, usually confined to short distances from the source (i.e., 50 feet or less).

3.6 Existing Conditions

The land uses of the project area include primarily commercial and some multi-family residential along the Coast Highway, with adjacent neighborhoods of primarily single-family residential land uses. Some land uses are considered more sensitive to noise than others due to the types of activities that typically occur at the receptor location. Noise-sensitive receptors are typically defined as land uses that are considered more sensitive to intrusive noise than others, such as residences, schools, motels and hotels, libraries, and hospitals, due to the land use activities typically occurring at the receptor (i.e., sleeping, concentrating, and convalescing).

The City's General Plan Noise Element identifies that residences, schools, churches, libraries, hospitals, convalescent homes, and similar use buildings require specific consideration in the selection of locations and construction materials to maintain acceptable noise levels (City of Oceanside 2002). Existing noise sensitive uses in proximity to the Complete Streets improvements project area (i.e., within approximately 500 feet) include residential uses, hotel/motels, a public library, seven churches, and two schools; no hospitals, nursing homes, or parks are currently located in proximity to the improvements corridor. Specifically, existing multi-family residences uses are located along the Coast Highway corridor and its cross streets with Neptune Way, Surfrider Way, Michigan Avenue, Washington Avenue, and Cassidy Street, as well as existing single- and multi-family residential uses located along the cross streets of

Michigan Avenue and Kelly Street. The Oceanside Public Library is located adjacent to the corridor. Seven churches (St Mary Star of the Sea, Grace Chapel of the Coast, First Christian, Grace Christian, St. Anne Episcopal, Second Missionary Baptist, and Church of Christ) are located in proximity to the corridor, as close as approximately 290 feet from the corridor. The St. Mary Start of the Sea School and the Santa Margarita School are located approximately 270 feet and 255 feet from the corridor, respectively. The Turning Point Crisis Center (a residential drug and alcohol rehabilitation center) is located approximately 225 feet from the corridor.

Existing noise sensitive uses in proximity to (i.e., within approximately 500 feet) of the Incentive District boundary include the uses described for the Complete Streets improvements corridor as well as additional residential uses and hotel/motels; no additional schools, libraries, churches, hospitals, nursing homes, or parks are in proximity to the Incentive District beyond those mentioned previously for the Complete Streets improvements. Specifically, the additional existing single- and multi-family residences are located within and in proximity to the entire Incentive District boundary.

All other noise-sensitive uses regulated by the City are located at greater distances from the project area (i.e., the Complete Streets improvements and Incentive District) which, due to attenuation with distance, would experience lower noise levels from potential sources of project construction noise in the project area.

Existing Ambient Daytime Noise Levels

The predominant existing noise source in the project area is roadway traffic noise from the Coast Highway corridor and its cross streets of Neptune Way, Surfrider Way, Michigan Avenue, Washington Avenue, Oceanside Boulevard, Cassidy Street, and Kelly Street. In addition, intermittent but frequent train traffic occurs on the railway mainline located parallel to the Coast Highway project corridor, approximately 800 feet to the west, with the Oceanside Station located along the rail line between Seagaze Drive and Michigan Avenue. The rail line and station are served by regional and commuter passenger rail (Amtrak and Metrolink/Coaster). Secondary noise sources include general commercial- and residential-related operational activities, such as loading dock/delivery truck activities, trash compaction, refuse service activities, and those specific to the commercial activity (e.g., tire and auto repair shops). In addition, aircraft flyovers occur randomly from commercial and military aircraft. The nearest commercial airport is the Oceanside Municipal Airport located approximately 1.8 miles east of the Coast Highway project corridor.

Ambient noise measurements were conducted at six representative locations along the Coast Highway project corridor, at the noise sensitive land uses (i.e., residences) nearest to project intersections of the corridor, to establish conservative ambient noise levels. The measurement locations along with existing development and nearby future development are shown in Figure 1. Short-term (15-minute) noise measurements were conducted at locations ST-1 through ST-6. Ambient sound measurements were conducted on Thursday, August 18, 2016, from approximately 12 p.m. to 3 p.m. to establish ambient conditions in the project area.

The ambient noise measurements were conducted using the Larson-Davis 824 Precision Integrated Sound Level Meter (SLM), which is a Type 1 standard instrument, as defined in the American National Standard Institute S1.4. All instruments were calibrated and operated according to the applicable manufacturer specification. The SLM microphone was placed at a height of 5 feet above the local grade, at the following measurement locations to represent the existing noise environment:

Measurement Location ST-1: The SLM was placed at multi-family residential uses along Neptune Way west of Coast Highway.

Measurement Location ST-2: The SLM was placed at multi-family residential uses along Surfrider Way west of Coast Highway.

Measurement Location ST-3: The SLM was placed at single- and multi-family residential uses along Michigan Avenue east of Coast Highway.

Measurement Location ST-4: The SLM was placed at single- and multi-family residential uses along Washington Avenue east of Coast Highway.

Measurement Location ST-5: The SLM was placed at multi-family residential uses along Cassidy Street west of Coast Highway.

Measurement Location ST-6: The SLM was placed at single- and multi-family residential uses along Kelly Street west of Coast Highway.

A summary of noise measurement data is provided in **Table 1**. The existing ambient daytime noise levels range from the lowest at ST-6 at 59 dBA L_{eq} to the highest at ST-2 at 74 dBA L_{eq}.

TABLE 1
SUMMARY OF AMBIENT NOISE MEASUREMENTS

Location, Duration, Existing Land Uses, and Date of Measurements	Daytime (7 A.M. to 10 P.M.) Hourly L_{eq}
ST-1 – Multi-family Residential Uses 8/18/16 (12:14 P.M. to 12:30 P.M.)/Thursday	63 dBA
ST-2 – Multi-family Residential Uses 8/18/16 (12:35 P.M. to 12:50 P.M.)/Thursday	74 dBA
ST-3 – Multi-family Residential Uses 8/18/16 (12:58 P.M. to 1:13 P.M.)/Thursday	61 dBA
ST-4 – Single- and multi-family Residential Uses 8/18/16 (1:20 P.M. to 1:35 P.M.)/Thursday	61 dBA
ST-5 – Multi-family Residential Uses 8/18/16 (2:21 P.M. to 2:34 P.M.)/Thursday	69 dBA
ST-6 – Single- and multi-family Residential Uses 8/18/16 (14:42 P.M. to 14:57 P.M.)/Thursday	59 dBA

SOURCE: ESA 2017

Existing Roadway Noise Levels

Existing roadway noise levels were calculated for 44 roadway segments located in the project area based on existing traffic volumes reported in the TIA. The roadway segments selected for analysis are considered to be those that are expected to be the most directly impacted by the project, which, for the purpose of this analysis, includes the roadways that are located near and immediately adjacent to the project area. These roadways, when compared to roadways located further away from the project area, would experience the greatest percentage of changes in traffic by the project (as distances are increased from the project area, traffic is spread out over a greater geographic area and its effects are reduced).

Calculation of the existing roadway noise levels was accomplished using the Federal Highway Administration's (FHWA's) Highway Noise Prediction Model and traffic volumes at the study intersections analyzed in the project's TIA (IBI 2017). The model calculates the average noise level at specific locations based on traffic volumes, average speeds, and site environmental conditions. The average daily noise levels (dBA CNEL) along these roadway segments are presented in **Table 2**.

TABLE 2
EXISTING ROADWAY NOISE LEVELS

Roadway Segment	Existing Land Uses Located Along Roadway Segment	dBA CNEL[a]
Coast Highway		
Between SR-76 Ramps and Surfrider Way	Commercial	68.2
Between Surfrider Way and Civic Center Drive	Residential/Commercial	66.3
Between Civic Center Drive and Pier View Way	Commercial	66.3
Between Pier View Way and Mission Way	Commercial	66.0
Between Mission Way and Seagaze Street	Commercial	66.4
Between Seagaze Street and Missouri Avenue	Residential/Commercial	66.7
Between Missouri Avenue and Washington Avenue	Commercial	66.5
Between Washington Avenue and Wisconsin Avenue	Residential/Commercial	66.5
Between Wisconsin Avenue and Oceanside Boulevard	Commercial	67.3
Between Oceanside Boulevard Morse Street	Residential/Commercial	67.4
Between Morse Street and Cassidy Street	Commercial	66.9
Between Cassidy Street and Vista Way	Lodge/Commercial	67.5
Between Vista Way and Eaton Street	Commercial	67.0
Vista Way		
Between Broadway Street and Coast Highway	Residential/Commercial	60.5
Between Coast Highway and Ditmar Street	Residential/Commercial	67.3
Cassidy Street		
Between Broadway Street and Tremont Street	Residential/Commercial	61.9
Between Tremont Street and Coast Highway	Residential/Commercial	63.0
Between Coast Highway and Freeman Street	Residential/Commercial	62.2
Between Freeman Street and Ditmar Street	Residential/Commercial	62.0

TABLE 2
EXISTING ROADWAY NOISE LEVELS

Roadway Segment	Existing Land Uses Located Along Roadway Segment	dBA CNEL[a]
Morse Street		
Between Coast Highway and Freeman Street	Commercial	60.2
Between Freeman Street and Ditmar Street	Residential/Commercial	57.3
Oceanside Boulevard		
Between Tremont Street and Coast Highway	Commercial	62.9
Between Coast Highway and Ditmar Street	School/Commercial	68.4
Wisconsin Avenue		
Between Tremont Street and Coast Highway	Commercial	63.3
Between Coast Highway and Freeman Street	Residential/Commercial	59.9
Between Freeman Street and Ditmar Street	Residential/Commercial	59.9
Washington Avenue		
West of Coast Highway	Commercial	53.3
East of Coast Highway	Residential/Commercial	53.0
Missouri Avenue		
West of Coast Highway	Commercial	55.4
East of Coast Highway	Residential/Commercial	53.2
Michigan Avenue		
West of Coast Highway	Commercial	60.2
East of Coast Highway	Residential/Commercial	57.6
Seagaze Street		
Between Tremont Street and Coast Highway	Commercial	63.9
Between Coast Highway and Freeman Street	Commercial	64.5
Between Freeman Street and Ditmar Street	Commercial	64.5
Mission Avenue		
Between Cleveland Street and Coast Highway	Commercial	63.1
Between Coast Highway and Horne Street	Commercial	64.0
Pier View Way		
West of Coast Highway	Commercial	59.8
Between Coast Highway and Horne Street	Commercial	58.8
Civic Center Drive		
West of Coast Highway	Residential/Commercial	57.8
East of Coast Highway	Residential/Commercial	59.8
Surfrider Way		
West of Coast Highway	Residential/Commercial	62.8
East of Coast Highway	Residential/Commercial	58.8

[a] Based on noise levels at 25 feet distance from the roadway and residential uses if residential uses are shown along roadways.

SOURCE: ESA 2017

Existing Ground-borne Vibration Levels

Aside from periodic construction work that may occur throughout the City, other sources of ground-borne vibration in the project area include heavy-duty vehicular travel (e.g., refuse trucks, delivery trucks) on local roadways. Truck traffic at a distance of 50 feet typically generates ground-borne vibration velocity levels of approximately 63 VdB (approximately 0.006 in/sec PPV). These levels could reach 72 VdB (approximately 0.016 in/sec PPV) where trucks pass over irregularities in the road surface.

3.7 Regulatory Setting

This section presents a discussion of the relevant regulatory setting and noise regulations, plans, and policies applicable to the proposed project.

California Department of Transportation Vibration Guidance

While there are no state or California Department of Transportation (Caltrans) vibration standards, the Caltrans *Transportation and Construction Vibration Guidance Manual* provides guidelines that can be used as screening tools for assessing the potential for adverse vibration effects related to structural damage and human perception. The manual is meant to provide practical guidance to Caltrans engineers, planners, and consultants who must address vibration issues associated with the construction, operation, and maintenance of Caltrans projects. The vibration criteria established by Caltrans for assessing structural damage and human perception are shown in **Table 3** and **Table 4**, respectively.

TABLE 3
CALTRANS VIBRATION DAMAGE POTENTIAL THRESHOLD CRITERIA

	Maximum PPV (in/sec)	
Structure and Condition	**Transient Sources**	**Continuous/Frequent Intermittent Sources**
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

NOTE: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

SOURCE: Caltrans 2013. Transportation and Construction Vibration Guidance Manual. September.

TABLE 4
CALTRANS VIBRATION PERCEPTION POTENTIAL CRITERIA

Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.9	0.10
Severe	2.0	0.4

NOTE: Transient sources create a single isolated vibration event, such as blasting or drop balls. Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

SOURCE: Caltrans 2013. Transportation and Construction Vibration Guidance Manual. September.

City of Oceanside General Plan Noise Element

The City's General Plan Noise Element establishes acceptable noise levels within the City's jurisdiction (City of Oceanside 2002). The Noise Element establishes the following noise level regulations for construction related noise that pertains to the proposed project:

1. It should be unlawful for any person within any residential zone of 500 feet therefrom to operate any pile driver, power shovel, pneumatic, power hoist, or other construction equipment between 8:00 p.m. and 7:00 a.m. generating an ambient noise level of 50 dBA at any property line, unless an emergency exists.
2. It should be unlawful for any person to operate any construction equipment at a level in excess of 85 dBA at 100 feet from the source.
3. It should be unlawful for any person to engage in construction activities between 6:00 p.m. and 7:00 a.m. when such activities exceed the ambient noise level by 5 dBA. A special permit may be granted by the Director of Public Works if extenuating circumstances exist.

The City's Noise Element also outlines general noise policies as follows:

- Noise levels shall not be so loud as to cause danger to public health in all zones except manufacturing zones where noise levels may be greater.
- Noise shall be controlled at the source where possible.
- Noise shall be intercepted by barriers or dissipated by space where the source cannot be controlled.
- Noise shall be reduced from structures by the use of soundproofing where other controls fail or are impractical.
- Noise levels shall be considered in the approval of any projects or activities, public or private, which requires a permit or other approval from the City.

- Noise levels shall be considered in any changes to the Land Use and Circulation Elements of the General Plan.
- Noise levels of City vehicles, construction equipment, and garbage trucks shall be reduced to acceptable levels.

City of Oceanside Noise Ordinance

Chapter 38 of the City of Oceanside Municipal Code (Noise Ordinance) governs operational noise and contains the maximum 1-hour average sound levels for various land uses for operational noise. The Noise Ordinance sets an allowed level for single-family and medium-density residential areas to 50 dBA L_{eq} from 7:00 a.m. to 9:59 p.m., and 45 dBA L_{eq} from 10:00 p.m. to 6:59 a.m. High density residential areas are limited to 55 dBA L_{eq} from 7:00 a.m. to 9:59 p.m. and 50 dBA L_{eq} from 10:00 p.m. to 6:59 a.m. **Table 5** outlines these acceptable limits.

TABLE 5
CITY OF OCEANSIDE EXTERIOR NOISE STANDARDS

Zone	Applicable Limit (dBA)	Time Period
Residential Estate, Single-Family Residential, Medium Density Residential, Agricultural, Open Space	50	7:00 A.M. to 9:59 P.M.
	45	10:00 P.M. to 6:59 A.M.
High Density, Residential Tourist	55	7:00 A.M. to 9:59 P.M.
	50	10:00 P.M. to 6:59 A.M.
Commercial	65	7:00 A.M. to 9:59 P.M.
	60	10:00 P.M. to 6:59 A.M.
Industrial	70	7:00 A.M. to 9:59 P.M.
	65	10:00 P.M. to 6:59 A.M.
Downtown	65	7:00 A.M. to 9:59 P.M.
	55	10:00 P.M. to 6:59 A.M.

SOURCE: City of Oceanside Municipal Code Section 38.12, 2016

Construction work may be exempt from the noise level limits established in Table 5 by the City Manager upon a determination that the authorization furthers the public interest. However, Section 38.17 specifically prohibits the operation of any pneumatic or air hammer, pile driver, steam shovel, derrick, steam, or electric hoist, parking lot cleaning equipment, or other appliance, the use of which is attended by loud or unusual noise, between the hours of 10:00 p.m. and 7:00 a.m. Section 38.16 prohibits nuisance noise as recommend in the General Plan Noise Element. It is unlawful for any person to make, continue, or cause to be made or continued, within the limits of the City, any disturbing, excessive, or offensive noise which causes discomfort or annoyance to reasonable persons of normal sensitivity. However, Section 35.15 exempts construction, maintenance or other public improvement activities by government agencies or public utilities.

City of Oceanside Engineering Manual

Construction noise in the City is governed by the City Engineering Manual. Construction is normally limited to the hours of 7:00 a.m. to 6:00 p.m., Monday through Friday.

4. Impacts and Mitigation Measures

This section describes the impact analysis relating to noise and vibration impacts for the proposed project, including the significance criteria, analysis methods and applicable thresholds used to determine the impacts and any required mitigation measures, if necessary.

The significance criteria are applicable to both the Complete Streets improvements and Incentive District components of the proposed project. Impact methodology and analyses are provided separately based on the project-level approach to near-term construction of the Complete Streets improvements and the programmatic approach to potential future redevelopment under the Incentive District.

4.1 Methodology

Construction Noise

Construction noise levels of the Complete Streets improvements were estimated using the FHWA's Roadway Construction Noise Model (RCNM) and information regarding likely construction equipment provided by the City. Potential noise levels were identified for the nearest sensitive receptors located off-site based on their respective distances from the proposed Complete Streets improvements. To present a conservative impact analysis, the estimated noise levels were calculated for a scenario in which all construction equipment was assumed to be operating simultaneously and located at the construction area nearest to the affected receptors. These assumptions represent the worst-case noise scenario because construction activities would typically be spread out along the Coast Highway corridor and would be located further away from the affected receptors. The estimated noise levels at the affected receptors were then compared against the City's construction noise standards established in the City General Plan Noise Element and Municipal Code, as applicable, to determine whether exceeding standards, and against existing ambient noise levels to determine whether a substantial temporary increase would occur.

Construction activity that could occur using the Incentive District provisions has the potential to generate construction noise from potential new development and redevelopment. Specific future development projects that could use the Incentive District provisions are not known at this time. As a result, specific future project-level construction information, such as development locations, construction, schedules and import and export soil quantities, are not known at this time. However, the potential construction noise levels associated with future project-level construction were estimated based on typical construction equipment noise levels. These noise levels at distances were then compared against the City's construction noise standards established in the City General Plan Noise Element and Municipal Code to determine whether noise standards could be exceeded and whether a substantial temporary increase could occur.

A significant increase in ambient noise levels may be temporary or permanent. Construction noise is typically considered temporary and short term (i.e., its effect on the environment ceases upon conclusion of construction activities). A substantial temporary increase in ambient noise levels is defined as a direct project-related increase of 10 dBA L_{eq} or greater, based on the noise standard that a 10 dBA increase is perceived by the human ear as twice as loud (FTA 2006).

Ground-borne Vibration

Ground-borne vibration levels generated from construction activities at the Complete Streets improvements were estimated at the source using data published by the Federal Transportation Administration (FTA) in its *Transit Noise and Vibration Impact Assessment* document. The attenuation of these potential construction vibration levels were calculated at nearby vibration sensitive locations (i.e., existing structures and humans) for the potential for structural damage and human perception and annoyance based on their distance from construction activities.

As with noise, construction activity that would occur in the Incentive District has the potential to generate construction vibration from potential redevelopment as a result of potential future use of heavy-duty construction equipment in proximity to vibration sensitive receptors (i.e., structures and people). However, the locations of future development projects under the Incentive District are not known at this time. However, the potential construction vibration levels associated with future project-level construction can be estimated at the source and at distances from construction activities in proximity to sensitive receptors, based on typical vibration levels of construction equipment used for typical construction activities. The estimated construction vibration levels at distances were then compared against the vibration impact criteria shown in Table 4 to determine whether would expose structures or persons to excessive vibration levels.

Roadway Noise

Construction-related traffic noise levels of the Complete Streets improvements were calculated based on project traffic information provided in the TIA. The roadway segments selected for analysis are expected to be most directly impacted by construction-related traffic, which, for the purpose of this analysis, includes the roadways that are nearest to the Complete Streets improvements, adjacent to the identified noise-sensitive receptors. The construction noise levels of the Complete Streets improvements portion of the project were calculated using the FHWA-RD-77-108 model based on construction-related traffic volumes provided in the TIA.

The Complete Streets improvements would result in several roadway and intersection changes along the Coast Highway corridor; this is not anticipated to generate additional vehicle trips as compared to existing conditions. The Complete Streets improvements would convert Coast Highway from four lanes to two lanes throughout the project corridor, with segments of two southbound travel lanes between SR-76 and Surfrider Way, and south of Kelly Street to Eaton Street. The Complete Streets improvements would also result in replacing existing intersections with roundabout intersections and new on-street parking. Continuous bicycle facilities and streetscape improvements within the corridor would be provided. Traffic noise level changes associated with implementation of the Complete Streets improvements were calculated and

compared against applicable noise standards established in the City General Plan Noise Element and Municipal Code to determine whether these noise level changes would exceed standards, and compared against existing ambient noise levels to determine whether a substantial permanent increase would occur.

Incentive District adoption could result in additional development and redevelopment in the currently commercially designated areas of the Coast Highway corridor. The potential vehicle traffic from the development that would be anticipated under the Incentive District is included in the projected traffic data from the project TIA and is included in the traffic noise analysis contained in this report. Future roadway noise levels without the Incentive District were calculated along various arterial segments adjacent to the Coast Highway corridor as compared to calculated future baseline traffic noise levels that would occur with implementation of the Incentive District.

Stationary Noise Sources

The construction Complete Streets improvements would not include any facilities that would generate operational noise. Therefore, there would be no operational noise impacts associated with the Complete Streets improvements.

Future project-level development that could occur within the Incentive District would include stationary noise sources (e.g., HVAC); however, their actual future locations are not identified as part of the Incentive District as this information is not known at this time. For this reason, the anticipated noise effects from individual development projects under the Incentive District are analyzed at a programmatic level, considering the typical noise levels generated by stationary sources compared to local regulations and existing ambient noise levels.

4.2 Thresholds of Significance

Consistent with Appendix G of the CEQA Guidelines, the project would result in a significant impact on noise and/or ground-borne vibration if it would:

1. Expose people to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
2. Expose people to or generation of excessive ground-borne vibration or ground-borne noise levels.
3. Result in a substantial permanent increase in ambient noise levels in the project area above levels existing without the project.
4. Result in a substantial temporary or periodic increase in ambient noise levels in the project area above levels existing without the project.
5. Expose people residing or working in the project area to excessive noise levels for a proposed project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within 2 miles of a public airport or public use airport.

6. Expose people residing or working in the project area to excessive noise levels for a proposed project located in the vicinity of a private airstrip.

4.3 Project Impacts

Issue 1: Would the proposed project expose persons to, or generate, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Complete Streets Improvements

Construction of the project would require the use of heavy equipment during the demolition, grading, and excavation activities associated with the Complete Streets improvements. During each stage of development, there would be a different mix of equipment. As such, construction activity noise levels at and near the project would fluctuate depending on the particular type, number, and duration of use of the various pieces of construction equipment.

Individual pieces of construction equipment anticipated during project construction could produce maximum noise levels of 77 dBA to 90 dBA L_{max} at a reference distance of 50 feet from the noise source, as shown in **Table 6**. These maximum noise levels would occur when equipment is operating at full power. The estimated usage factors for the equipment are also shown in Table 6, which is based on FHWA's RCNM User's Guide.

TABLE 6
CONSTRUCTION EQUIPMENT NOISE LEVELS

Construction Equipment	Estimated Usage Factor, %	Noise Level at 50 Feet (dBA, Lmax)
Backhoe	40%	80
Compactor	20%	83
Concrete Saw	20%	90
Excavator	40%	81
Forklift	10%	75
Grader	40%	85
Paver	50%	77
Paving Equipment	20%	90
Roller	20%	80
Rubber Tired Loader	50%	79
Pavement Breaker	20%	89
Trencher	50%	85

SOURCE: FHWA 2006

However, equipment used on construction sites often operate under less than full power conditions, or part power. To more accurately characterize construction-period noise levels, the

average (L_{eq}) noise levels associated with each construction stage is provided in **Table 7**. These average noise levels are based on the quantity, type, and usage factors for each type of equipment that would likely be used during each construction stage, and are typically attributable to multiple pieces of equipment operating simultaneously.

TABLE 7
CONSTRUCTION AVERAGE L_{EQ} NOISE LEVELS BY DISTANCE AND CONSTRUCTION STAGE

	Sound Level in dBA (L_{eq}) at Doubled Distance				
Construction Stage	**25 feet**	**50 feet**	**100 feet**	**200 feet**	**400 feet**
Demolition	93	87	81	75	69
Vegetation Grubbing/Clearing	87	81	75	69	63
Site Surface Grading	88	82	76	70	64
Facilities Construction	91	85	79	73	67
Paving	95	89	83	77	71
Site Restoration	88	82	76	70	64

Assumes a hard surface propagation path drop-off rate of 6 dB per doubling of distance (sound level at distance X = sound level at 50 feet - 20LOG (x/50)), which is appropriate for use in characterizing point-source (such as construction equipment) sound attenuation.

SOURCE: ESA 2016

Table 7 provides the estimated worst-case construction noise levels at potential nearby noise sensitive receptors from a particular construction area along the project Coast Highway corridor. The estimated noise levels represent a conservative scenario because construction activities are analyzed as occurring at the closest extent of the construction areas from the nearest noise sensitive receptor. However, construction activities would typically be moving throughout the construction area, on average, farther away from the nearest noise-sensitive receptors, which would result in actual lower noise levels.

As shown in Table 7, the average temporary construction-period (i.e., various construction stages) noise level would range from approximately 75 to 83 dBA L_{eq} at 100 feet, and from approximately 69 to 77 dBA L_{eq} at 200 feet from construction activities of the Complete Streets improvements These noise levels would be considered loud compared to the City's operational noise level limits (non-construction) for the zoning classification of "high density, residential tourist" of 55 dBA L_{eq} daytime. However, the construction noise would occur during the daytime, when sleeping typically does not occur, and thus these land uses are less sensitive.

Construction activities of the Complete Streets improvements would be required to comply with the City's noise standards. The City's General Plan Noise Element prohibits construction between 8 p.m. and 7 a.m. within 500 feet of a residential area generating a noise level of 50 dBA at the property line. Consistent with this policy, construction of the Complete Streets improvements would occur from 7:00 a.m. to 6:00 p.m. Monday through Saturday, and no construction would occur on Sundays. The City's Municipal Code also prohibits construction between 10 p.m. to 7 a.m. for private development projects. However, Section 35.15 of the Code exempts construction,

maintenance or other public improvement activities by government agencies or public utilities. The proposed street improvements would be construction by a government agency (i.e., the City). Regardless, the project would be constructed within the more stringent parameters that apply to private projects. Therefore, the construction of the Complete Streets improvements would adhere to the City's regulatory requirements applying to construction noise. For these reasons, construction noise generated by the Complete Streets improvements would not expose persons to, or generate, noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies; and therefore, noise impacts would be less than significant.

Incentive District

The Incentive District could result in an increase in intensity of development and redevelopment within the commercially designated areas of the project corridor. Future development within commercial zones along project corridor would be infill development. The placement of residential infill adjacent to non-residential land uses could result in operational noise impacts on residential land uses because of the differences of the allowable maximum exterior noise levels between residential and commercial land uses. However, the timing of the construction activities of individual projects associated with the Incentive District is unknown and cannot be determined at this time. Construction of individual projects would occur as property owners decide that development is warranted based in large part on the market. Additionally, the duration of construction is dependent on individual project types.

Table 7 provides the estimated worst-case construction noise levels of construction activities at various distances from the construction activities. The estimated noise levels represent a conservative scenario because construction activities are analyzed as occurring at the closest extent of the construction areas from the nearest noise sensitive receptor; whereas, construction activities would typically be moving throughout the construction area, farther away from the nearest noise-sensitive receptors. As shown in Table 7, the average temporary construction-period (i.e., various construction stages) noise levels would range from approximately 87 to 95 dBA L_{eq} at 25 feet, and from 65 to 74 dBA L_{eq} at 200 feet from a construction area. These construction noise levels would be considered loud compared to the City's operational noise level limits (non-construction) for areas zoned residential tourist of 55 dBA L_{eq} daytime, as shown in Table 5. However, the Incentive District construction noise would be expected occur during the daytime, as required by the City, when residential noise sensitive land uses (i.e., sleeping activities), are not typically occurring.

Construction activities of the Incentive District would be required to comply with the City's noise standards. The City's General Plan Noise Element prohibits construction between 8 p.m. and 7 a.m. within 500 feet of a residential area generating a noise level of 50 dBA at the property line, and operating any construction equipment at a level in excess of 85 dBA measured at 100 feet from the source. The City's Municipal Code prohibits construction between 10 p.m. to 7 a.m. Therefore, the construction of the projects under the Incentive District would adhere to the City's regulatory requirements applying to construction noise. For these reasons, construction of the development projects that would occur through implementation of the Incentive District would

not expose persons to, or generate, noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies. For these reasons, no conflicts with applicable noise standard would occur with construction of the individual projects under the Incentive District; noise impacts for this issue would be less than significant.

Issue 2: Would implementation of the proposed project expose people to, or generate, excessive ground-borne vibration or ground-borne noise levels?

Complete Streets Improvements

Construction of the project would have the potential to generate low levels of ground-borne vibration as the operation of heavy equipment (i.e., backhoe, excavators, grader, loader, and haul trucks, etc.) generates vibrations that propagate though the ground and diminish in intensity with distance from the source. No high-impact activities, such as pile driving or rock blasting, would be used during construction of the Complete Streets improvements. The nearest off-site receptors to the Complete Streets improvements that could be exposed to vibration levels generated from construction include single-family residential uses west of the Coast Highway corridor. Ground-borne vibrations from typical construction activities very rarely reach the levels at structures that can damage structures, but they may be perceived by humans in buildings very close (i.e., within 25 feet) to a construction activity.

The vibration levels for several types of heavy construction equipment that can generate perceptible vibration levels are identified in **Table 8**, *Vibration Source Levels for Construction Equipment*. Based on the information presented in Table 8, vibration levels could range from 0.003 to 0.089 in/sec PPV at 25 feet from the operation of the equipment.

TABLE 8
VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

	Approximate PPV (in/sec)				
Equipment	**25 Feet**	**50 Feet**	**60 Feet**	**75 Feet**	**100 Feet**
Large Bulldozer	0.089	0.031	0.024	0.017	0.011
Caisson Drilling	0.089	0.031	0.024	0.017	0.011
Loaded Trucks	0.076	0.027	0.020	0.015	0.010
Jackhammer	0.035	0.012	0.009	0.007	0.004
Small Bulldozer	0.003	0.001	0.0008	0.0006	0.0004

NOTE: Pile driving would not be necessary for of the Complete Streets improvements.

SOURCE: FTA 2006. Transit Noise and Vibration Impact Assessment. May.

As indicated in Table 8, the highest vibration level of 0.089 in/sec PPV at 25 feet from the operation of a large bulldozer would reduce to 0.031 in/sec PPV at 50 feet. At 100 feet, the vibration level from a large bulldozer would further reduce to 0.011 in/sec PPV.

As previously shown in Tables 3 and 4, Caltrans provides threshold criteria for potential structural damage to fragile buildings of 0.2 in/sec PPV, and human perception of strongly perceptible at 0.1 in/sec PPV. Therefore, for a noise-sensitive receptor to be exposed to the Caltrans vibration threshold of strongly perceptible to humans of 0.1 in/sec PPV, the receptor would need to be located within 25 feet of the construction activity of typical heavy construction equipment as shown in Table 8 (assuming no pile driving is required for construction). This analysis assumes that pile driving is not necessary for Complete Streets construction, as specified by the City of Oceanside.

The Complete Streets improvements would occur within existing roadway intersections and street segments, which are greater than 25 feet from inhabited buildings. Therefore, construction activity of the Complete Streets improvements would not cause significant vibration impacts for the vibration threshold of human perception. As the vibration threshold of human perception of 0.1 in/sec PPV is lower than the vibration threshold of potential structural damage of 0.2 in/sec PPV , the threshold distance (i.e., setback distance) between equipment and receptor is greater for the human perception threshold and, and therefore, is more stringent and conservative for vibration impact analysis. Therefore, the construction vibration levels for the Complete Streets improvements would be less than significant.

Sources of ground-borne vibration from the operation of the Complete Streets improvements (once constructed) would include heavy-duty vehicular travel (e.g., refuse trucks, delivery trucks) on local roadways. Because the sources of ground-borne vibration and distances from receptors would be unchanged from the existing conditions, operational vibration impacts of the improvements at the off-site receptors would be consistent with the existing vibration velocity levels and with the existing ambient vibration velocity levels. As such, operational vibration impacts of the Complete Streets improvements would be less than significant.

Incentive District

With regard to construction activities of the potential development under the Incentive District, ground-borne vibration would be generated from the operation of heavy equipment primarily during site clearing and grading activities and to a lesser degree by off-site haul-trucks traveling on surface streets. The type of structures and construction methods and equipment of each of the potential developments of the Incentive District is unknown at this time. Pile driving during foundation development and vibratory compaction during surface grading may be required. Vibratory compaction rollers generate vibration levels of 0.210 in/sec PPV at 25 feet (FTA 2006). Pile driving has the greatest potential to generate high groundborne vibration levels, ranging from 0.170 to 1.518 in/sec PPV at 25 feet (FTA 2006) depending upon pile driving method and usage. Therefore, pile driving would have the potential to exceed the Caltrans human perception vibration threshold of 0.1 in/sec PPV within 150 feet, depending on the site specific soil conditions, pile driving methods and equipment used.

Due to the densely developed area within the Incentive District boundaries and the inability to know the exact nature of future proposed projects under the Incentive District, development within the Incentive District zone could be adjacent to other properties with existing structures

(e.g., residences, commercial businesses). Therefore, construction activities of typical heavy construction equipment (e.g., as detailed in Table 8) associated with the Incentive District could result in temporary significant ground-borne vibration impacts that would exceed the threshold of human perception to sensitive receptors. Typical heavy equipment is defined as engine size of 600 horsepower or greater, such as large dozers, large excavators, and large loaders.

Depending on the location of the future development projects occurring under the provisions of the Incentive District, there may or may not be residences located in proximity to the development that would be potentially affected by the construction vibration.

The following mitigation measure would be required to avoid significant vibration impacts.

> **MM Incentive District NOI-1:** For development projects considered under the Incentive District provisions, a project-level vibration analysis would be required if the construction plans for the project would include the use of any of the following:
>
> 1. Typical heavy construction equipment within 25 feet of existing inhabited structures. Typical heavy equipment is defined as equipment with an engine size of 600 horsepower or greater and includes: large dozers, large excavators, and large loaders.
> 2. Vibratory compaction rollers for use within 80 feet of inhabited structures.
> 3. Pile drivers are proposed for use within 150 feet of inhabited structures.
>
> If none of the construction methods mentioned in the enumerated list above are proposed within the described boundaries, no further analysis would be required since the distances to sensitive receptors would create enough of a buffer to ensure impacts are less that significant.
>
> The purpose of each project-level vibration analysis would be to determine if the specific project-level construction would generate vibration levels exceeding the human perception threshold of 0.1 in/sec PPV at the receptor. Project specific details that would be required in each analysis would include, but not be limited to, actual construction equipment type, sizes, and horsepower to be used, specific locations of each activity, and actual distances from the activity to inhabited buildings. Vibration levels of actual equipment to be used shall be estimated from FTA vibration guidance documents (FTA 2006), attenuated with distance to the inhabited structures, and compared to the Caltrans vibration threshold for human perception. If applicable, the intervening ground between equipment and structures would be considered for its soil properties for additional vibration attenuation.

If the project-specific analysis determines that a project-specific significant impact could occur mitigation shall be required to reduce the impact to less than significant. Alternative construction methods and equipment that generate lower vibration levels shall be considered. Estimated construction vibration levels would be required to not to exceed the vibration threshold of human perception at inhabited buildings (0.1 in/sec PPV at the receptor). Field vibration measurement surveys of actual construction vibration would be considered, as determined to be required by the vibration specialist, as part of construction vibration compliance with the threshold.

This requirement shall be implemented for all projects under the Incentive District (Administrative Development Plan Review, Development Plan Review, and Conditional Use Permit processing requirements as specified in Section 1203 of the Coast Highway Incentive District).

Implementation of MM Incentive District NOI-1 would avoid construction ground-borne vibration impacts associated with implementation of the Incentive District.

Operational activities that would occur during the Incentive District would include typical residential and commercial-grade stationary mechanical and electrical equipment such as air handling units, condenser units, exhaust fans, and electrical emergency power generators, which would produce vibration at the source. Ground-borne vibration generated by each of the above-mentioned activities would be similar to the existing vibration generated by existing operational sources (i.e., similar to traffic vibration on adjacent roadways) in the vicinity. The potential vibration impacts from all operation activities at the closest structure locations would be less than the significance threshold for perceptibility. As such, vibration impacts associated with operation of the projects developed under the Incentive District provisions would be below the significance threshold, and operation impacts would be less than significant.

Issue 3: Would implementation of the proposed project result in a substantial permanent increase in ambient noise levels in the project area above levels existing without the proposed project?

Future (2035) Traffic Conditions

Future roadway noise levels without the project were calculated along various arterial segments adjacent to the Coast Highway corridor as compared to calculated 2035 baseline traffic noise levels that would occur with implementation of the project. The future traffic scenario with the project includes both the Complete Streets improvement and a predicted net traffic change associated with the development under the Incentive District.

According to the project's TIA (IBI 2017), the Future With Project 2035 scenario generates a lower vehicle miles traveled per capita by approximately 11 percent when compared to the baseline Future Without Project Condition. This result is expected as the project seeks to promote smart growth with strategies such as encouraging and emphasizing multimodal transportation to increase access and mobility. This would be a benefit to some roadway segments as it would reduce traffic volumes and traffic noise levels. As shown in **Table 9**, traffic noise levels were

reduced at 22 roadway segments with the implementation of the Complete Streets improvements (specifically, traffic noise levels were reduced by 5.3 dBA along Cassidy Street between Freeman Street and Ditmar Street).

TABLE 9
OFF-SITE TRAFFIC NOISE IMPACTS – FUTURE (2035) WITH PROJECT CONDITIONS

	Calculated Traffic Noise Levels at 25 Feet from Roadway CNEL (dBA)			
Roadway Segment	**Future without Project (A)**	**Future with Project (B)**	**Project Increment (B-A)**	**Exceed Threshold?**
Coast Highway				
Between SR-76 Ramps and Surfrider Way	69.0	70.2	1.2	No
Between Surfrider Way and Civic Center Drive	67.1	68.3	1.2	No
Between Civic Center Drive and Pier View Way	67.6	68.1	0.5	No
Between Pier View Way and Mission Way	67.6	68.0	0.4	No
Between Mission Way and Seagaze Street	68.0	68.3	0.3	No
Between Seagaze Street and Missouri Avenue	67.3	67.0	-0.3	No
Between Missouri Avenue and Washington Avenue	67.3	66.6	-0.7	No
Between Washington Avenue and Wisconsin Avenue	67.4	66.8	-0.6	No
Between Wisconsin Avenue and Oceanside Boulevard	68.3	67.9	-0.4	No
Between Oceanside Boulevard and Morse Street	68.0	68.5	0.5	No
Between Morse Street and Cassidy Street	67.1	68.0	0.9	No
Between Cassidy Street and Vista Way	67.7	68.6	0.9	No
Between Vista Way and Eaton Street	67.3	68.6	1.3	No
North of West Street	65.4	64.0	-1.4	No
South of West Street	65.5	63.9	-1.6	No
North of Kelly Street	63.7	66.0	2.3	No
South of Kelly Street	63.2	64.1	0.9	No
Vista Way				
Between Broadway Street and Coast Highway	61.9	62.1	0.2	No
Between Coast Highway and Ditmar Street	67.8	68.4	0.6	No
Cassidy Street				
Between Broadway Street and Tremont Street	63.1	62.1	-1.1	No
Between Tremont Street and Coast Highway	63.6	63.5	-0.1	No
Between Coast Highway and Freeman Street	62.8	62.6	-0.2	No
Between Freeman Street and Ditmar Street	63.3	58.0	-5.3	No
Morse Street				
Between Coast Highway and Freeman Street	62.4	63.3	0.9	No
Between Freeman Street and Ditmar Street	59.9	60.8	0.9	No
Oceanside Boulevard				
Between Tremont Street and Coast Highway	63.8	64.5	0.7	No
Between Coast Highway and Ditmar Street	69.1	68.7	-0.4	No
Wisconsin Avenue				
Between Tremont Street and Coast Highway	64.7	64.7	0.0	No
Between Coast Highway and Freeman Street	61.2	63.3	2.1	No
Between Freeman Street and Ditmar Street	59.3	65.3	6.0	**Yes**

TABLE 9
OFF-SITE TRAFFIC NOISE IMPACTS – FUTURE (2035) WITH PROJECT CONDITIONS

Roadway Segment	Calculated Traffic Noise Levels at 25 Feet from Roadway CNEL (dBA)			
	Future without Project (A)	Future with Project (B)	Project Increment (B-A)	Exceed Threshold?
Washington Avenue				
West of Coast Highway	55.3	59.1	3.8	No
East of Coast Highway	54.3	56.8	2.5	No
Missouri Avenue				
West of Coast Highway	56.1	54.6	-1.5	No
East of Coast Highway	55.4	58.0	2.6	No
Michigan Avenue				
West of Coast Highway	65.4	62.3	-3.1	No
East of Coast Highway	58.0	59.8	1.8	No
Seagaze Street				
Between Tremont Street and Coast Highway	66.4	66.0	-0.4	No
Between Coast Highway and Freeman Street	63.4	63.3	-0.1	No
Between Freeman Street and Ditmar Street	66.2	67.2	1.0	No
Mission Avenue				
Between Cleveland Street and Coast Highway	65.2	64.9	-0.3	No
Between Coast Highway and Horne Street	65.2	64.5	-0.7	No
Pier View Way				
West of Coast Highway	61.8	60.8	-1.0	No
Between Coast Highway and Horne Street	60.9	59.8	-1.1	No
Civic Center Drive				
West of Coast Highway	59.5	59.8	0.3	No
East of Coast Highway	61.1	60.8	-0.3	No
Surfrider Way				
West of Coast Highway	63.2	64.7	1.5	No
East of Coast Highway	60.0	60.7	0.7	No

[a] Based on noise levels at 25 feet distance from the roadway and residential uses if residential uses are shown along roadways.

SOURCE: ESA 2017

However, as summarized in Table 9, the potential increase in project-related future traffic noise levels (due primarily to redistribution of traffic volumes from lane reduction along the Coast Highway corridor) over the future traffic noise levels would increase in some locations. Of these increases, the only significant increase would be along the roadway segment of Wisconsin Avenue, between Freeman Street and Ditmar Street. In this location, increase in traffic noise compared to 2035 Future Without Project Condition is predicted to be as much as 6.0 dBA CNEL, which would be a significant increase in noise levels due to the project, as this increase in sound level would exceed the significance threshold of a 5 dBA CNEL increase. The increase in sound would be substantially lower at the remaining roadway segments analyzed, and other noise impacts along the project area roadway segments would be less than significant.

In conclusion, the project-related noise increases that would occur with implementation of the Complete Streets project and development that would be anticipated to occur under the Incentive District provisions would result in a significant impact along one roadway segment, Wisconsin Avenue between Freeman Street and Ditmar Street. Because of the configuration of existing land uses in this area, these impacts could not be avoided with implementation of the project. Specifically, existing residential uses and the Saint Mary Star of the Sea School are using the roadway segment of Wisconsin Avenue between Freeman Street and Ditmar Street for access. Thus, the addition of sound walls or other attenuation approaches are not feasible in this location. As such, noise impacts would be ***significant and unavoidable*** along this roadway segment.

Stationary Noise

The construction for the Complete Streets improvements would not include any stationary facilities that would introduce a new operational noise source. Therefore, there would be no operational noise impacts associated with the Complete Streets improvements.

Implementation of the Incentive District would include operational stationary noise sources; a particular project would generate noise and expose off-site sensitive receptors to noise sources typical of mixed-use areas such as doors slamming, air conditioning units, property maintenance equipment (e.g., landscape, parking lot sweeping) radio/stereos systems, domestic animals, etc. These noise sources contribute to the ambient noise levels experienced in all similarly-developed areas, and typically do not exceed the noise standards for the types of land uses. In addition, these noise sources are consistent with adjacent uses in the vicinity. Therefore, stationary point-source noise impacts resulting future projects developed under the Incentive District would not exceed ambient noise levels and thus would not result in a substantial increase in ambient noise levels.

Development under the Incentive District could result in new commercial and residential developments located adjacent to noise sensitive properties such as existing residential areas. Depending on how close these developments are situated to the existing residential areas, the types of mechanical equipment used at the developments, and the activities that would occur at the developments, may increase the ambient noise levels. Chapter 38 of the Oceanside Municipal Code (Noise Ordinance) governs operational noise and contains the maximum 1-hour average sound level limits for various land uses for operational noise, as shown in Table 5. For this reason, it is assumed that all mechanical equipment would be designed with appropriate noise-control devices, such as sound attenuators, acoustic louvers, or sound screens/parapet walls, to comply with noise limitation requirements provided in the City Noise Ordinance, which prevents the noise from such equipment from exceeding the sound level limits. Therefore, operation of mechanical equipment associated with the Incentive District would not exceed the City's noise thresholds, and impacts would be less than significant.

Issue 4: Would implementation of the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

Complete Streets Improvements

Construction activities would increase existing ambient noise levels at noise sensitive receptors (i.e. residences) in proximity to the construction activity. As shown in Table 7, construction noise would average approximately 80 dBA L_{eq} at 100 feet from a construction activity, which would temporarily increase existing ambient noise levels of approximately 65 dBA L_{eq} at sensitive receptor locations along the project corridor, as shown in Figure 1 (i.e., an approximate 15 dBA increase). As discussed in Section 4.1 Methodology, a substantial temporary increase in ambient noise levels is defined as a direct project-related increase of 10 dBA L_{eq} or greater (FTA 2006). Therefore, these impacts would be considered significant.

To reduce construction noise impacts associated with the Complete Streets construction, the following mitigation measures shall be required.

MM Complete Streets NOI-1: The following field techniques shall be implemented by the City's construction contractor to reduce construction- related noise at nearby noise-sensitive receptors (residential uses):

a. Unless safety provisions require otherwise, the Complete Streets construction contractor shall adjust all audible back-up alarms to the lowest volume appropriate for safety purposes (i.e., still maintaining adequate signal-to-noise ratio for alarm effectiveness). The contractor shall consider signal persons, strobe lights, or alternative safety equipment and/or processes as allowed, for reducing reliance on high-amplitude sonic alarms.

b. The construction contractor shall place stationary noise sources at the construction site, such as generators and air compressors, away from affected noise-sensitive receivers (residential and school uses). Non-noise-producing mobile equipment, such as trailers, shall be located in the direct sound pathways between suspected major noise-producing sources and sensitive receptors.

c. Noise producing equipment (e.g., jackhammers and pavement breakers) shall use noise attenuating shields, shrouds, or portable barriers or enclosures, to reduce operating noise.

d. Line or cover hoppers, storage bins, and chutes shall include sound-deadening material (e.g., apply wood or rubber liners to metal bin impact surfaces).

e. To the extent practicable and available, the construction contractor shall use construction equipment manufactured or modified to reduce noise and vibration emissions, such as: electric instead of diesel-powered equipment, hydraulic tools instead of pneumatic tools, and electric saws instead of air- or gasoline-driven saws.

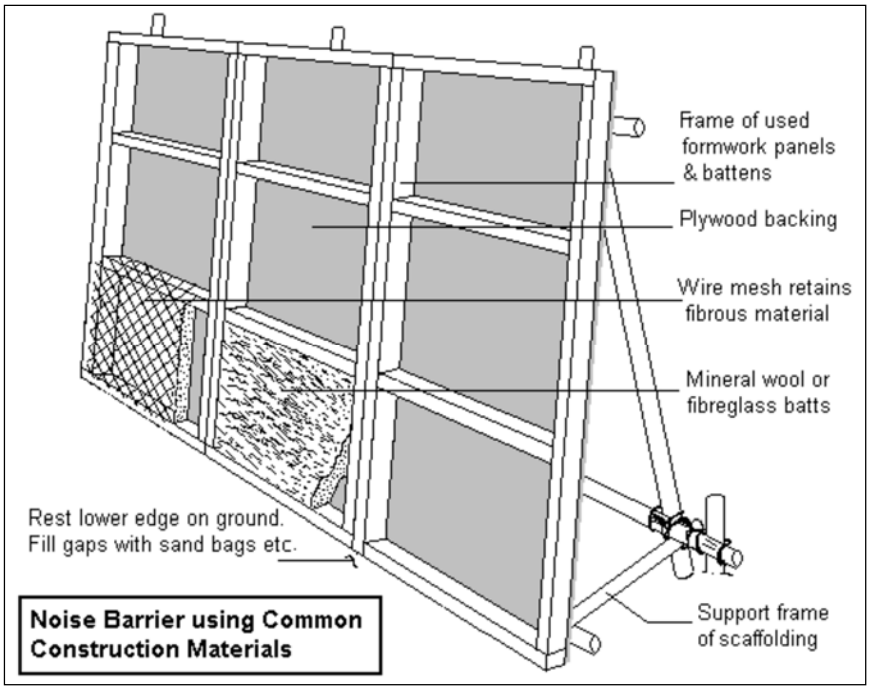
MM Complete Streets NOI-2: Where feasible, the City's contractor shall install temporary, field-erected noise barriers to block the line-of-site between construction

equipment and sensitive receptors prior to construction (in the Complete Streets project area these are limited to residential uses). Noise barriers could include sound blankets hanging on existing fences, or the use of freestanding portable sound walls. Noise barriers should be a minimum of 8-feet in height and continuous between the source of noise and adjacent or nearby noise-sensitive receptors. Noise barriers are most effective when placed directly adjacent to either the noise source or receptor.

Barrier construction may include, but not necessarily limited to, using appropriately thick wooden panel walls (at least one-half inch thick), as shown in **Figure 3**, which are tall enough to block the line-of-sight between the dominant construction noise source(s) and the noise-sensitive receptor. Such barriers can reduce construction noise by 5 to 15 dBA at nearby noise-sensitive receptor locations, depending on barrier height and length, and the distance between the barrier and the noise-producing equipment or activity. Alternatively, field-erected noise curtain assemblies could be installed around specific equipment sites or zones of anticipated mobile or stationary activity, resembling the sample shown in **Figure 4**. These techniques are most effective and practical when the construction activity noise source is stationary (e.g., auger or drill operation) and the specific source locations of noise emissions are near the ground and can be placed as close to the equipment/activity-facing side of the noise barrier as possible. Barrier layout and other implementation details would vary by construction site.

The barrier material is assumed to be solid and dense enough to demonstrate acoustical transmission loss that is at least 10 dBA greater than the estimated noise reduction effect. These suggested barrier types do not represent the only ways to achieve the indicated noise reduction in dBA; they represent examples of how such noise attenuation might be attained by an implemented measure under the right conditions.

Implementation of MM Complete Streets NOI-1 and NOI-2 would reduce construction noise impacts. With the noise reduction achieved with the noise barriers of NOI-2, the attenuated construction noise levels at a source would be reduced by 5 to 15 dBA L_{eq}, which would attenuate to a less than substantial increase in daytime ambient noise levels at an adjacent residential uses. However, mitigation measure NOI-2 (i.e., barriers) may not be feasible to implement at all locations at all times during construction activities, due to potential physical constraints at a location which allow for line-of sight between a noise source and a residence. For example, existing fences may not be tall enough or sturdy enough to support noise blankets being attached and the placement of temporary barriers could endanger construction crew members and equipment and would restrict removal of impacted materials beneath the barriers. Therefore, impacts would be potentially ***significant and unavoidable*** with regard to a temporary substantial increase in ambient noise levels.



City of Oceanside Coast Highway Corridor Study Project / 130217

Figure 3
Temporary Noise Wall Barrier Construction



City of Oceanside Coast Highway Corridor Study Project / 130217

Figure 4
Curtain-Type Noise Barrier

Incentive District

As discussed previously, construction activities could substantially increase ambient noise levels at noise sensitive receptors (i.e., existing residences and schools) in proximity to the future construction activity at the potential development within the Incentive District. As shown in Table 7, construction noise would average approximately 80 dBA L_{eq} at 100 feet from construction activities, which would temporarily increase existing ambient noise levels of approximately 65 dBA, by approximately 15 dBA L_{eq} at existing residences to be located within the Incentive District. As discussed in Section 4.1 Methodology, a substantial temporary increase in ambient noise levels is defined as a direct project-related increase of 10 dBA L_{eq} or greater (FTA 2006). Therefore, these impacts would be considered significant.

For these reasons, MM Incentive District NOI-1 and NOI-2, as applied for the Complete Streets improvements, shall be required for projects that are proposed under the Incentive District, to reduce noise generated by construction equipment in proximity to noise sensitive receptors (i.e., for the Incentive District, existing residences and schools).

> **MM Incentive District NOI-1:** For individual development projects proposed under the Incentive District, the following field techniques shall be implemented by the project construction contractor to reduce construction- related noise at noise-sensitive receptors within 100 feet of construction activity:
>
> a. Unless safety provisions require otherwise, the Incentive District construction contractor shall adjust all audible back-up alarms to the lowest volume appropriate for safety purposes (i.e., still maintaining adequate signal-to-noise ratio for alarm effectiveness). The contractor shall consider signal persons, strobe lights, or alternative safety equipment and/or processes as allowed, for reducing reliance on high-amplitude sonic alarms.
>
> b. The construction contractor shall place stationary noise sources at the construction site, such as generators and air compressors, as far away as possible from affected noise-sensitive receivers (residential and school uses). Non-noise-producing equipment, such as trailers, may be located as a sound barrier between suspected major noise-producing sources and sensitive receptors.
>
> c. Noise producing equipment (e.g., jackhammers and pavement breakers) shall use noise attenuating shields, shrouds, or portable barriers or enclosures, to reduce operating noise.
>
> d. Line or cover hoppers, storage bins, and chutes shall include sound-deadening material (e.g., apply wood or rubber liners to metal bin impact surfaces).
>
> e. To the extent practicable and available, the construction contractor shall use construction equipment manufactured or modified to reduce noise and vibration emissions, such as: electric instead of diesel-powered equipment, hydraulic tools instead of pneumatic tools, and electric saws instead of air- or gasoline-driven saws.

MM Incentive District NOI-2: Where feasible, temporary, field-erected noise barriers to block the line-of-site between construction equipment and sensitive receptors shall be installed prior to construction of the individual development projects under the Incentive District. Noise barriers could include sound blankets hanging on existing fences, or freestanding portable sound walls. Noise barriers should be a minimum of 8-feet in height and continuous between the source of noise and adjacent or nearby noise-sensitive receptors. Noise barriers are most effective when placed directly adjacent to either the noise source or receptor.

Barrier construction may include, but not necessarily limited to, using appropriately thick wooden panel walls (at least one-half inch thick), as shown in Figure 3, which are tall enough to block the line-of-sight between the dominant construction noise source(s) and the noise-sensitive receptor. Such barriers can reduce construction noise by 5 to 15 dBA at nearby noise-sensitive receptor locations, depending on barrier height and length, and the distance between the barrier and the noise-producing equipment or activity. Alternatively, field-erected noise curtain assemblies could be installed around specific equipment sites or zones of anticipated mobile or stationary activity, resembling the sample shown in Figure 4. These techniques are most effective and practical when the construction activity noise source is stationary (e.g., auger or drill operation) and the specific source locations of noise emissions are near the ground and can be placed as close to the equipment/activity-facing side of the noise barrier as possible. Barrier layout and other implementation details would vary by construction site.

Implementation of MM Incentive District NOI-1 and NOI-2 would reduce construction noise levels. With the noise reduction achieved with the noise barriers descried in MM Incentive District NOI-2, the attenuated construction noise levels at a source could be reduced by 5 to 15 dBA L_{eq}, which, in some cases, would attenuate to a less than substantial increase in daytime ambient noise levels at adjacent residential uses, and result in a less than significant impact. However, MM Incentive District NOI-2 may not be feasible to implement at all locations at all times during construction activities, due to potential physical constraints at a location which do not block line-of sight between a noise source and a residence. For example, existing fences may not be tall enough or sturdy enough to support noise blankets being attached and the placement of temporary barriers could endanger construction crew members and equipment. Therefore, impacts would be potentially ***significant and unavoidable*** with regard to a temporary substantial increase in ambient noise levels.

Issue 5: For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The project site is located approximately 1.8 miles west of the Oceanside Municipal Airport and is outside of the airport 60 CNEL noise contours.[1] Therefore, the project would not expose people to excessive noise levels from airport activities, and no impacts would occur due to the project.

Issue 6: For a project within the vicinity of a private airstrip, heliport or helistop, would the project expose people residing or working in the project area to excessive noise levels?

The project site is not located within the vicinity of a private airstrip, or heliport or helistop. Therefore, the project would not expose people residing or working in the project area to excessive noise levels from such uses.

4.4 Cumulative Impacts

CEQA Guidelines require a discussion of cumulative impacts of a project "when the project's incremental effect is cumulatively considerable" (2011 CEQA Guidelines, Section 15130). As defined by Section 15065 (a)(3) "cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (2011 CEQA Guidelines, Section 15065 (a)(3)). These cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines Section 15355).

The geographic context for the analysis of cumulative impacts for noise depends on the impact being analyzed. For example, the project's contribution to localized impacts, such as those associated with project construction and project operation/traffic noise, could affect the local neighborhood and project's traffic study area. This cumulative impacts section provides a cumulative impact analysis of the entire project (Complete Streets improvements and the Incentive District), but separately for project construction and project operation given the variation of timing of these project activities.

Construction

The construction of the project includes the near-term construction of the project-level Complete Streets improvements, and the construction of potential redevelopment under the Incentive District. As previously discussed, the improvements are slated to occur in specific locations with a scheduled near-term start date and expected end date. The potential development and redevelopment under the Incentive District could occur at any qualifying parcel in the commercial area of the Incentive District at any time. Since the timing or sequencing of individual projects cannot be ascertained with any certainty any quantitative analysis to ascertain

[1] Airport Land Use Commission, San Diego County, Oceanside Municipal Airport Land Use Compatibility Plan, January 25, 2010.

the daily construction noise levels of multiple, concurrent construction would be speculative. However, the construction of the potential development under the Incentive District could start in the near-term. Therefore, it is possible that the Complete Streets project component and individual development projects implemented under the Incentive District could occur simultaneously, as well as, in proximity to each other.

The geographic scope for the consideration of cumulative project construction noise impacts are primarily the areas immediately surrounding the project site (as specified for the improvements and potentially occurring within the Incentive District boundary) and to a lesser degree, along designated haul routes where heavy construction truck traffic would travel during the project construction period. Generally, noise impacts are limited to the area directly surrounding the noise source, as noise attenuates with distance at a higher rate in proximity to the source, and only has the potential to combine with other noise sources occurring simultaneously in the immediate vicinity.

The proposed project's impacts, when viewed together with the environmental impacts from past, present, and probably future projects, could be cumulatively considerable if ambient noise increases above the increase threshold. The project construction noise (for the improvements and the Incentive District) was determined to not expose persons to, or generate, noise levels in excess of standards established in the local General Plan or Noise Ordinance, or applicable standards of other agencies. Therefore, noise impacts would be less than significant. However, due primarily to the dense development of the project area, project construction noise would be in proximity to receptors, likely resulting in a substantial temporary increase in ambient noise. Therefore, these impacts would be considered significant.

Implementation of mitigation measures would reduce the construction noise impacts. However, mitigation measure may not be feasible to implement at all locations at all times during construction activities, due to potential physical constraints at a location which allow for line-of sight between a noise source and a residence. Therefore, impacts would be potentially ***significant and unavoidable*** with regard to a temporary substantial increase in ambient noise levels. Therefore, project construction noise would be of the magnitude to potentially combine with other cumulative projects potentially located in immediate proximity to the project site, where the noise could combine together to cumulatively substantially temporarily increase the ambient noise environment in the project area. Therefore, project construction could be a cumulatively considerable noise impact.

As previously discussed for vibration, the Complete Streets improvements would occur within existing roadway intersections and street segments, which are greater than 25 feet from structures and inhabited buildings. Therefore, the construction vibration levels would be less than the threshold (strongly perceptible to human), and the impact would be less than significant. However, construction activities associated with the Incentive District could result in temporary significant ground-borne vibration impacts that exceed the threshold of human perception to sensitive receptors located within 25 feet. Implementation of MM Incentive District NOI-1 would avoid construction ground-borne vibration impacts associated with implementation of the Incentive District. Due to the rapid attenuation characteristics of ground-borne vibration, and

distance separating construction associated with the project and any other cumulative projects, there is not a likely potential for cumulative vibration impacts. As well, implementation of MM Incentive District NOI-1 would avoid construction ground-borne vibration impacts associated with implementation of the Incentive District. Therefore, cumulative vibration impacts would be less than significant.

Operation

The operation of the project includes the operation of the project-level Complete Streets improvements and the operation of the potential redevelopment under the Incentive District. Typically, operational noise sources include stationary sources (e.g., HVAC systems of buildings) and/or mobile sources (e.g. vehicle trips).

The Complete Streets improvements would not construct any facilities with stationary noise sources (e.g., buildings) nor generate new vehicle trips; and therefore, would not introduce a new stationary or mobile operational noise sources. Therefore, there would be no operational noise impacts associated with the Complete Streets improvements. Implementation of the Incentive District would include the construction of new land uses which would include operational stationary noise sources and operational mobile sources from new vehicle trips.

The stationary operational noise sources associated with the Incentive District would generate operational noise from stationary equipment on each potential development site. Because noise attenuates with distance from its source, noise impacts from stationary sources would be limited to each of their respective sites and their vicinities. For this reason, the noise associated with stationary noise sources resulting from development under the Incentive District would not contribute to a cumulative stationary noise impact.

Vehicular traffic associated with the Incentive District would generate mobile operational noise. This analysis first considers whether noise associated with future traffic is an overall cumulative impact. As well, it is considered to what degree the project would contribute to that cumulative noise impact and if that contribution is cumulative. The overall potential cumulative impact from long-term mobile operational noise pertains to changes in roadway noise levels that could result from future traffic volumes associated with anticipated regional growth, including that under the Incentive District, along with traffic redistribution from the Complete Streets component of the project (**Table 10**). The incremental change for each street segment is compared to the significance threshold of 5 dBA CNEL. As shown in Table 10, the threshold would be exceeded for two street segments: along Wisconsin Avenue, between Freeman Street and Ditmar Street (5.4 dBA, CNEL) and along Washington Avenue, west of Coast Highway (5.8 dBA, CNEL). Therefore, future noise levels in these specific locations would be cumulatively significant.

TABLE 10
TRAFFIC NOISE IMPACTS – FUTURE (2035) CUMULATIVE INCREMENT

Roadway Segment	Calculated Traffic Noise Levels at 25 Feet from Roadway CNEL (dBA)			
	Existing (A)	Future with Project (B)	Cumulative Increment (B-A)	Exceed Threshold?
Coast Highway				
Between SR-76 Ramps and Surfrider Way	68.2	70.2	2.0	No
Between Surfrider Way and Civic Center Drive	66.3	68.3	2.0	No
Between Civic Center Drive and Pier View Way	66.3	68.1	1.8	No
Between Pier View Way and Mission Way	66.0	68.0	2.0	No
Between Mission Way and Seagaze Street	66.4	68.3	1.9	No
Between Seagaze Street and Missouri Avenue	66.7	67.0	0.3	No
Between Missouri Avenue and Washington Avenue	66.5	66.6	0.1	No
Between Washington Avenue and Wisconsin Avenue	66.5	66.8	0.3	No
Between Wisconsin Avenue and Oceanside Boulevard	67.3	67.9	0.6	No
Between Oceanside Boulevard and Morse Street	67.4	68.5	1.1	No
Between Morse Street and Cassidy Street	66.9	68.0	1.1	No
Between Cassidy Street and Vista Way	67.5	68.6	1.1	No
Between Vista Way and Eaton Street	67.0	68.6	1.6	No
Vista Way				
Between Broadway Street and Coast Highway	60.5	62.1	1.6	No
Between Coast Highway and Ditmar Street	67.3	68.4	1.1	No
Cassidy Street				
Between Broadway Street and Tremont Street	61.9	62.1	0.2	No
Between Tremont Street and Coast Highway	63.0	63.5	0.5	No
Between Coast Highway and Freeman Street	62.2	62.6	0.4	No
Between Freeman Street and Ditmar Street	62.0	58.0	-4.0	No
Morse Street				
Between Coast Highway and Freeman Street	60.2	63.3	3.1	No
Between Freeman Street and Ditmar Street	57.3	60.8	3.5	No
Oceanside Boulevard				
Between Tremont Street and Coast Highway	62.9	64.5	1.6	No
Between Coast Highway and Ditmar Street	68.4	68.7	0.3	No
Wisconsin Avenue				
Between Tremont Street and Coast Highway	63.3	64.7	1.4	No
Between Coast Highway and Freeman Street	59.9	63.3	3.4	No
Between Freeman Street and Ditmar Street	59.9	65.3	5.4	**Yes**
Washington Avenue				
West of Coast Highway	53.3	59.1	5.8	**Yes**
East of Coast Highway	53.0	56.8	3.8	No
Missouri Avenue				
West of Coast Highway	55.4	54.6	-0.8	No
East of Coast Highway	53.2	58.0	4.8	No
Michigan Avenue				
West of Coast Highway	60.2	62.3	2.1	No
East of Coast Highway	57.6	59.8	2.2	No

TABLE 10
TRAFFIC NOISE IMPACTS – FUTURE (2035) CUMULATIVE INCREMENT

Roadway Segment	Calculated Traffic Noise Levels at 25 Feet from Roadway CNEL (dBA)			
	Existing (A)	Future with Project (B)	Cumulative Increment (B-A)	Exceed Threshold?
Seagaze Street				
Between Tremont Street and Coast Highway	63.9	66.0	2.1	No
Between Coast Highway and Freeman Street	64.5	63.3	-1.2	No
Between Freeman Street and Ditmar Street	64.5	67.2	2.6	No
Mission Avenue				
Between Cleveland Street and Coast Highway	63.1	64.9	1.8	No
Between Coast Highway and Horne Street	64.0	64.5	0.5	No
Pier View Way				
West of Coast Highway	59.8	60.8	1.0	No
Between Coast Highway and Horne Street	58.8	59.8	1.0	No
Civic Center Drive				
West of Coast Highway	57.8	59.8	2.0	No
East of Coast Highway	59.8	60.8	1.0	No
Surfrider Way				
West of Coast Highway	62.8	64.7	1.9	No
East of Coast Highway	58.8	60.7	1.9	No

[a] Based on noise levels at 25 feet distance from the roadway and residential uses if residential uses are shown along roadways.

SOURCE: ESA 2017

The project's contribution to the cumulative noise impacts along these roadway segments can be determined by comparing projected future (2035) traffic noise levels without the project to the future (2035) traffic noise levels with the project (see Table 9). The project's contribution to increases in future noise levels along Wisconsin Avenue between Freeman Street and Ditmar Street is predicted to be 6.0 dBA CNEL and the project's contribution to increases in future noise levels along Washington Avenue west of Coast Highway is predicted to be 3.8 dBA CNEL. In both locations, the project's contribution would be perceptible (greater than 3 dBA). Therefore, the project contributes considerably to the significant cumulative impacts for the future (2035) traffic noise conditions along these two street segments. This is considered a significant impact of the project.

Sound walls are often used to address roadway noise impacts. However, due to the need for access points (for example, driveways to residences and street access to the Saint Mary Star of the Sea School), a wall could not be continuous and would not effectively shield the noise-sensitive uses from the roadway noise. In addition, the addition of sound walls would not be desirable as they would detract from the community character and visual quality of these neighborhoods. For these reasons, the addition of continuous sound walls to address these identified impacts would not be desirable or feasible. No other effective mitigation approaches are available. For these

reasons, the project's contribution to cumulative noise impacts along Wisconsin Avenue (between Freeman Street and Ditmar Street) and Washington Avenue (west of Coast Highway) is considered cumulatively considerable and ***significant and unavoidable***.

As previously discussed for project operation vibration, operational vibration impacts of the Complete Streets improvements at the off-site receptors would be consistent with the existing ambient vibration velocity levels. As such, operational vibration impacts of the Complete Streets improvements would be less than significant. Ground-borne vibration generated by the Incentive District development would be similar to the existing vibration generated by existing operational sources (i.e., similar to traffic vibration on adjacent roadways) in the vicinity. The potential vibration impacts from all operation activities at the closest structure locations would be less than the significance threshold of human perception. As such, vibration impacts associated with operation of the projects developed under the Incentive District provisions would be below the significance threshold, and operation impacts would be less than significant. Due to the rapid attenuation characteristics of ground-borne vibration, vibration levels similar to ambient levels, and distance separating development associated with the project and any other cumulative projects, there is no potential for cumulative vibration impacts. Therefore, cumulative vibration impacts would be less than significant.

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Appendix G
Traffic Impact Analysis (2018)

ESA

OCEANSIDE
COAST HIGHWAY
CORRIDOR STUDY

FINAL

Traffic Impact Analysis for the Coast Highway Corridor Study

Prepared for City of Oceanside
by IBI Group

August 29, 2018

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1 Introduction

This traffic impact analysis (TIA) has been prepared as part of the Coast Highway Corridor Study. The Coast Highway Corridor Study consists generally of Complete Street improvements to accommodate all modes of travel throughout the corridor within the existing public right-of-way.[1] The project corridor is located in Oceanside, CA in Northern San Diego County. The project limits extend from the northern terminus of Coast Highway at Harbor Drive through the City of Oceanside to Eaton Street near the city's southern boundary.

The development of this TIA is consistent with the guidelines established by the City of Oceanside in their General Plan Circulation Element document. The report is organized into seven sections:

- Section 1 – Introduction
- Section 2 – Project Description
- Section 3 – Analysis Methodology
- Section 4 – Existing Conditions
- Section 5 – Future Conditions
- Section 6 – Vehicle Miles Traveled
- Section 7 – Mitigations
- Section 8 – Accessibility
- Section 9 – Parking Inventory
- Section 10 – Conclusions and Recommendations
- Section 11 - Appendices

Section 1 provides a brief introduction to the purpose of this report and report content. Section 2 describes the project and its location in the City of Oceanside. Section 3 contains the methodology utilized to prepare the analysis. Sections 4, 5 and 6 document the analysis of existing and future traffic conditions for the key road segments and intersections within the study area. Section 7 identifies the mitigation measures required based on the impacts identified in Sections 4, 5, and 6. Section 8 provides an overview of the project design elements as it pertains to safety and mobility and the American with Disabilities Act (ADA). Section 9 identifies the existing parking conditions and how it will be affected in each scenario. Section 10 presents the conclusions and recommendations regarding the traffic analysis completed for the analysis of the Coast Highway Corridor Study. Section 11 contains the appendices.

[1] Complete Streets – Streets that are designed to enable safe access for all users including pedestrians, motorists, bicyclists, and transit riders across all ages. *California Department of Transportation (Caltrans)*

2 Project Description

The project study corridor is located in Oceanside, CA in Northern San Diego County. The project limits extend from the northern terminus of Coast Highway at Harbor Drive through the City of Oceanside to Eaton Street near the city's southern boundary (see Figure 2-1). The proposed Complete Street improvements for the corridor will primarily occur within the existing public right-of-way, which is typically 80-feet in width throughout the length of the study corridor.

The proposed project would transform Coast Highway into a complete street that accommodates all modes of travel in a safe and efficient manner. This planning effort is a follow up to the 2009 Coast Highway Vision and Strategic Plan (Vision Plan), which set forth a vision for land use and street improvements in the Coast Highway corridor. Key elements of the proposed project include a continuous Class II striped bicycle lane[2] from Harbor Drive to the south city limit, a single lane of travel for automobile traffic throughout the corridor, additional mid-block crosswalks to facilitate safe and convenient pedestrian crossings of the corridor, roundabouts in place of traffic signals where physically feasible and where the intersection traffic volumes support implementation, and other enhancements to landscaping or the roadway to implement the vision for the corridor established in the Vision Plan.

For the purposes of describing the proposed project, the Coast Highway corridor is divided into five major segments.

- Segment 1: Harbor Drive to State Route 76
- Segment 2: State Route 76 to Wisconsin Avenue
- Segment 3: Wisconsin Avenue to Oceanside Boulevard
- Segment 4: Oceanside Boulevard to Morse Street
- Segment 5: Morse Street to Eaton Street

Within each of the five segments, there can be minor differences on a block-by-block basis to accommodate variations in roadway configurations designed to provide appropriate traffic turning lanes, parking, or bicycle facilities. A description of the proposed roadway configuration on a segment-by-segment basis is provided below.

Segment 1: Harbor Drive to State Route 76 (Figure 2-2)

Between Harbor Drive and the San Luis Rey River Bridge, Coast Highway would be one lane in each direction with a center two way left turn lane (TWLTL). Class II striped bicycle lanes would be provided on both sides of the street and where street width permits, angled parking would be provided on the west side of street. On-street parking currently located along the eastern side of the roadway would be removed to accommodate the bicycle lane. The Harbor Drive and Coast Highway intersection would remain as a signalized intersection with no changes to lane geometry.

South of the San Luis Rey River Bridge, Coast Highway would remain as a two-lane roadway with Class II striped bicycle lanes on both sides of the street. On-street parking would continue to be provided on the west side of the street. The roadway and the bridge would be restriped to provide a Class II bicycle lane in both directions. A mid-block crosswalk is proposed across Coast Highway at Costa Pacifica. A two-lane roundabout is proposed at the intersection of Coast Highway and State Route 76.

[2] Class II Bike Lane – Striped lane for one-way bike travel on a street or highway. Bike lanes are marked with signs and pavement striping. *Manual on Uniform Traffic Control Devices (MUTCD) – Federal Highway Administration*

Segment 2: State Route 76 to Wisconsin Avenue (Figure 2-3)

Between State Route 76 and Surfrider Way, Coast Highway would provide two southbound lanes and one northbound traffic lane. Class II striped bicycle lanes would be provided on both sides of the street. A center TWLTL would also be provided. As is the case with the existing condition, no on-street parking is proposed in this section of the corridor. The outside southbound traffic lane closest to the curb would become a right turn lane at Surfrider Way. The traffic signal at Coast Highway and Surfrider Way would be replaced by a single lane roundabout.

From Surfrider Way to Pier View Way, Coast Highway would provide a single traffic lane and a Class II striped bicycle lane in each direction, with a buffer between the bicycle lane and adjacent parked cars. On-street parking would be provided on both sides of the street. A raised approximately two-foot wide center median would also be constructed. Single lane roundabouts would be constructed at the intersections of Coast Highway at Civic Center Drive and Pier View Way, replacing the traffic signals at these locations. A mid-block cross-walk would be provided across Coast Highway at Sportfisher Way on the south side of the intersection.

Between Pier View Way and Seagaze Drive, Coast Highway would continue to provide one traffic lane and a striped Class II bicycle lane in both directions. The intersections of Coast Highway at Mission Avenue and Seagaze Drive would remain signalized. Left turn and right turn pockets are proposed on Coast Highway at both intersections. As is the case in the existing condition, no on-street parking would be provided in this section of the corridor.

South of Seagaze Drive, the cross-section of Coast Highway would match the proposed section from Surfrider Way to Pier View Way, with one travel lane, a striped bicycle lane, and on-street parking provided in both directions. A raised two-foot wide median would also be provided. Single lane roundabouts are proposed to be constructed at Michigan Avenue, Washington Avenue and Wisconsin Avenue. Mid-block cross-walks are proposed at Topeka Avenue (between the west and east legs of this street), across the south leg of the intersection at Missouri Avenue, and across the south leg of the intersection at Minnesota Avenue. Unsignalized left turn movements in all directions would be removed at Topeka Avenue, Missouri Avenue, and Minnesota Avenue.

Segment 3: Wisconsin Avenue to Oceanside Boulevard (Figure 2-4)

This segment has a single proposed cross-section that would provide a single traffic lane, a Class II striped bicycle lane, and on-street parking in both directions. A raised two-foot wide median would also be constructed throughout this segment. Single lane roundabouts are proposed at West Street and Oceanside Boulevard. A mid-block cross-walk is proposed across the south leg of the intersection at Eucalyptus Avenue. Unsignalized left turn movements in all directions would be removed at Leonard Avenue, Stanley Avenue, and Eucalyptus Avenue.

Segment 4: Oceanside Boulevard to Morse Street (Figure 2-5)

This segment has a single proposed cross-section that would provide a single traffic lane, a Class II striped bicycle lane, and on-street parking in both directions. The center median would provide a center TWLTL throughout this segment, except approaching both directions of the Sprinter grade crossing, consistent with the existing condition. A single lane roundabout is proposed at Morse Street. Mid-block cross-walks are proposed across Coast Highway adjacent to the Sprinter Station south of Oceanside Boulevard and adjacent to the Loma Alta Creek footpath, south of the existing bridge. On-street parking would be added throughout this segment.

Segment 5: Morse Street to Eaton Street (Figure 2-6)

This segment has two proposed cross-sections. Between Morse Street and Kelly Street, Coast Highway would provide a single traffic lane, a Class II striped bicycle lane, and on-street parking in both directions. A raised two-foot wide median would also be constructed throughout this segment. Single lane roundabouts are proposed at Cassidy Street and Kelly Street. A mid-block cross-walk is proposed across the south leg of the intersection at Whaley Street. Unsignalized left turn movements would be removed in all directions at Whaley Street. On-street parking would be maintained in this segment.

South of Kelly Street, Coast Highway would look similar to the existing condition, with the exception of the northbound and westbound approaches to the intersection of Coast Highway and Vista Way. Northbound, Coast Highway would be reduced to a single through lane south of the intersection, with the outside through lane being converted to a right turn lane. The single northbound lane would continue north of the intersection to Kelly Street. On-street parking would be removed between Kelly Street and Vista Way along Coast Highway. Westbound Vista Way would be modified to provide one right turn lane, one through lane, and one left turn lane, with the eastbound direction of travel between Coast Highway and Freeman Street reduced to a single lane.

Project Alternative 1

The City of Oceanside has identified three alternatives to the Project described above. Project Alternative 1 proposes to maintain the existing roadway lane configuration south of Oceanside Boulevard. The differences between Project Alternative 1 and the Project are the following:

- Four travel lanes (two in each direction) from Oceanside Boulevard to just south of Vista Way
- Provide Class II striped bicycle lanes from Oceanside Boulevard to Morse Street (pre-pilot conditions) as in the existing condition
- Provide Class III[3] Sharrow markings on Coast Highway between Morse Street and Vista Way
- On-street parking on Coast Highway between Oceanside Boulevard and Vista Way would not be changed from the existing condition
- Remove proposed mid-block crossing at Sprinter Station and Loma Alta Creek
- Existing signalized intersections would be maintained at Surfrider Way, Oceanside Boulevard, Morse Street, and Cassidy Street
- Provide curb-extending mid-block pedestrian crossings at Whaley Street and Kelly Street
- Provide streetscape improvements along Coast Highway between Oceanside Boulevard and Vista Way, including enhancements to sidewalks and parkway landscaping

Project Alternative 2

Project Alternative 2 proposes to maintain the existing roadway lane configuration south of Morse Street. The differences between Project Alternative 2 and the Project are the following:

[3] Class Ill Bike Lane – Shared route with vehicles that has signs posted identifying it as a bike route and do not require pavement markings. *Manual on Uniform Traffic Control Devices (MUTCD) – Federal Highway Administration*

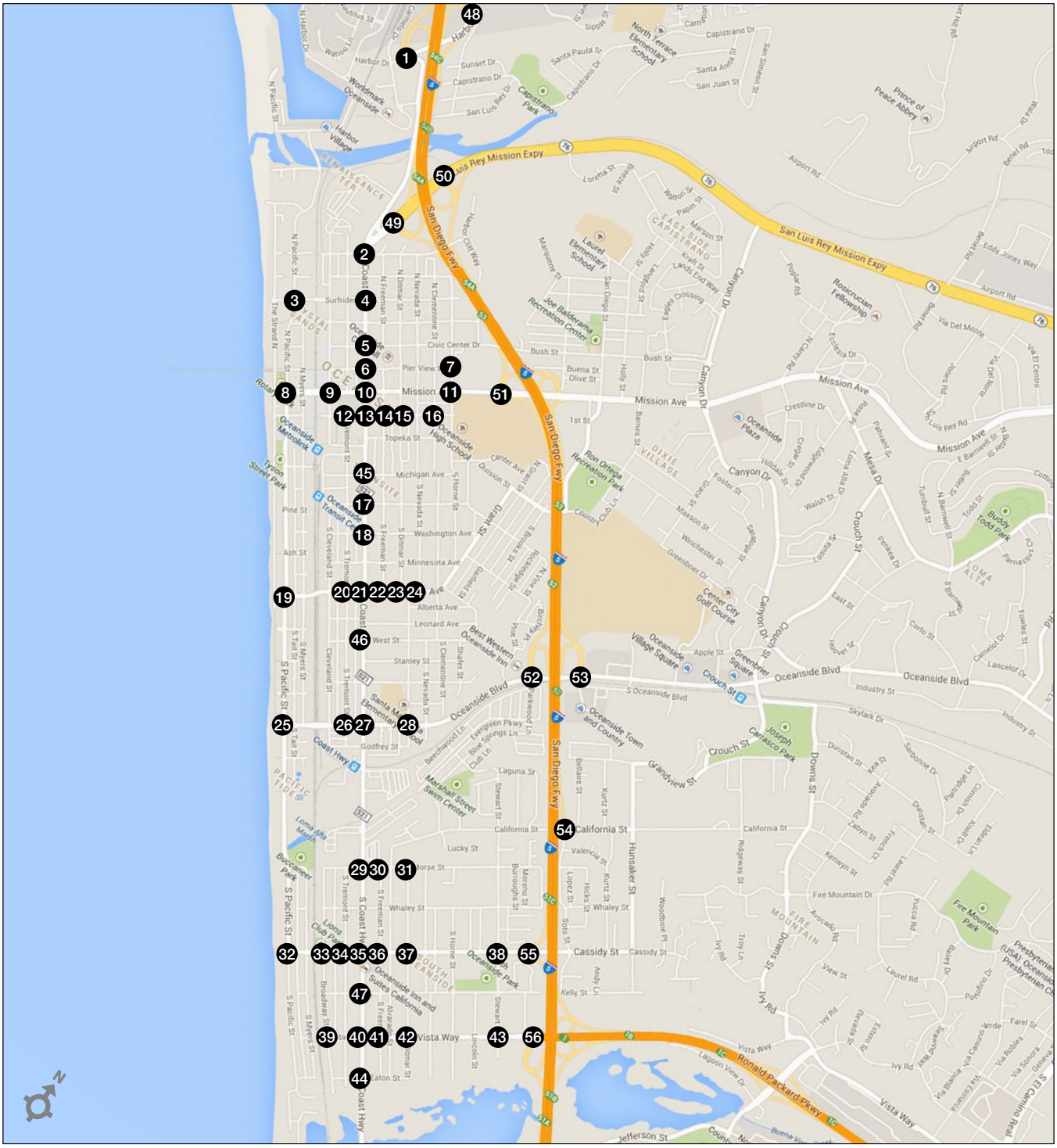
- Four travel lanes (two in each direction) from Morse Street to just south of Vista Way
- Provide Class III Sharrow markings on Coast Highway between Morse Street and Vista Way
- On-street parking on Coast Highway between Morse Street and Vista Way would not be changed from the existing condition
- Existing signalized intersections would be maintained at Surfrider Way, Oceanside Boulevard, Morse Street, and Cassidy Street
- Provide curb-extending mid-block pedestrian crossings at Whaley Street and Kelly Street
- Provide streetscape improvements along Coast Highway between Morse St and Vista Way, including enhancements to sidewalks and parkway landscaping

Project Alternative 3

Project Alternative 3 proposes to maintain the existing roadway lane configuration south of Morse Street. In addition, the proposed land use incentive overlay district would be terminated at Morse Street. Under this alternative, future land use development south of Morse Street is forecast to be consistent with the SANDAG regional growth projections and the 2035 No Project condition. The roadway network differences between Project Alternative 3 and the Project are the following:

- Four travel lanes (two in each direction) from Morse Street to just south of Vista Way
- Provide Class III Sharrow markings on Coast Highway between Morse Street and Vista Way
- On-street parking on Coast Highway between Oceanside Boulevard and Vista Way would not be changed from the existing condition
- Existing signalized intersections would be maintained at Surfrider Way, Oceanside Boulevard, Morse Street, and Cassidy Street
- Provide curb-extending mid-block pedestrian crossings at Whaley Street and Kelly Street. Provide streetscape improvements along Coast Highway between Oceanside Boulevard and Vista Way, including enhancements to sidewalks and parkway landscaping

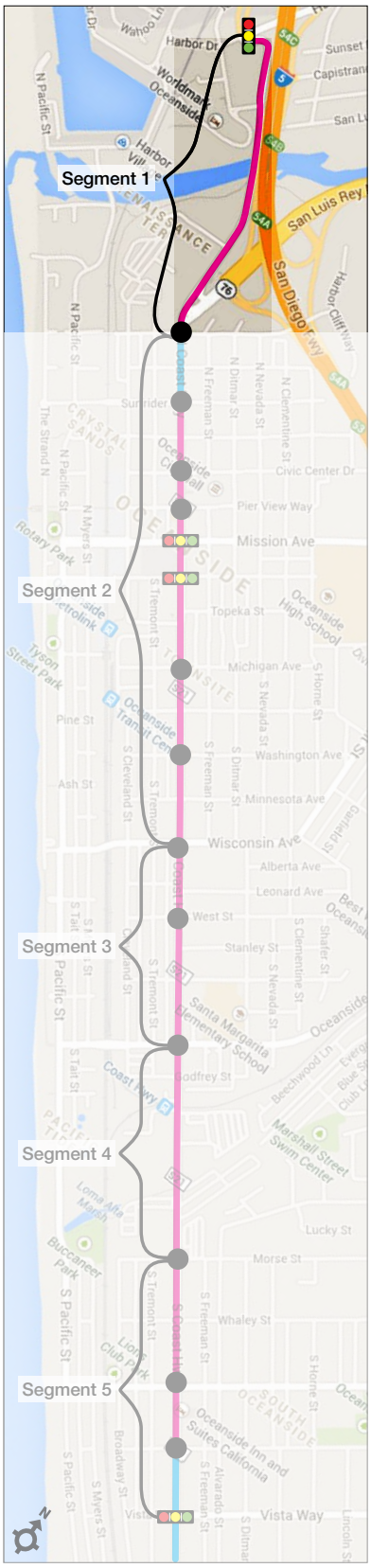
Figure 2-1 Study Area

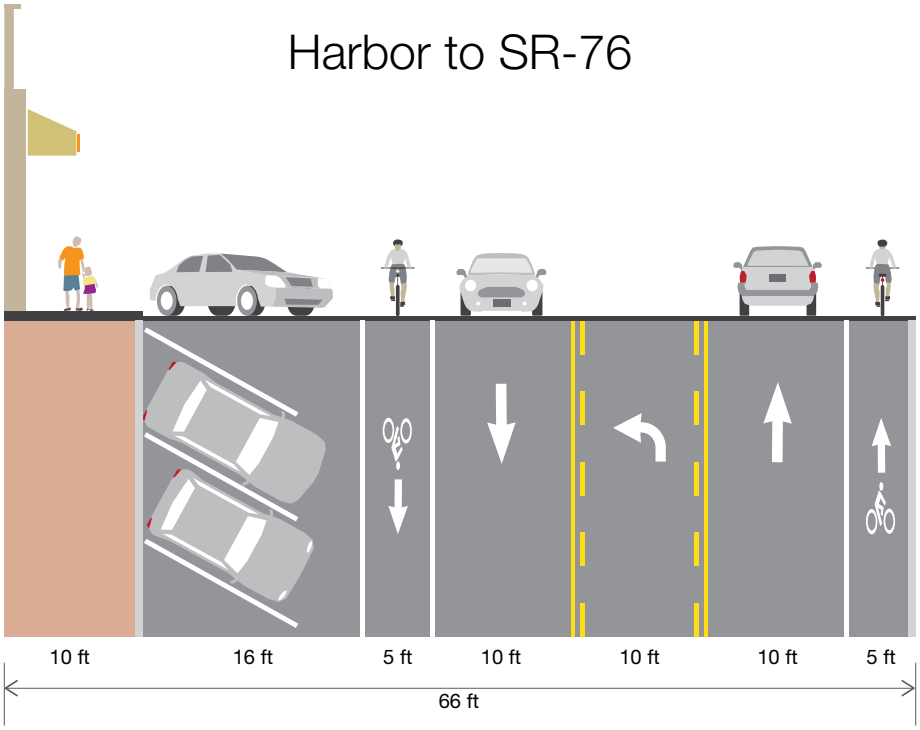


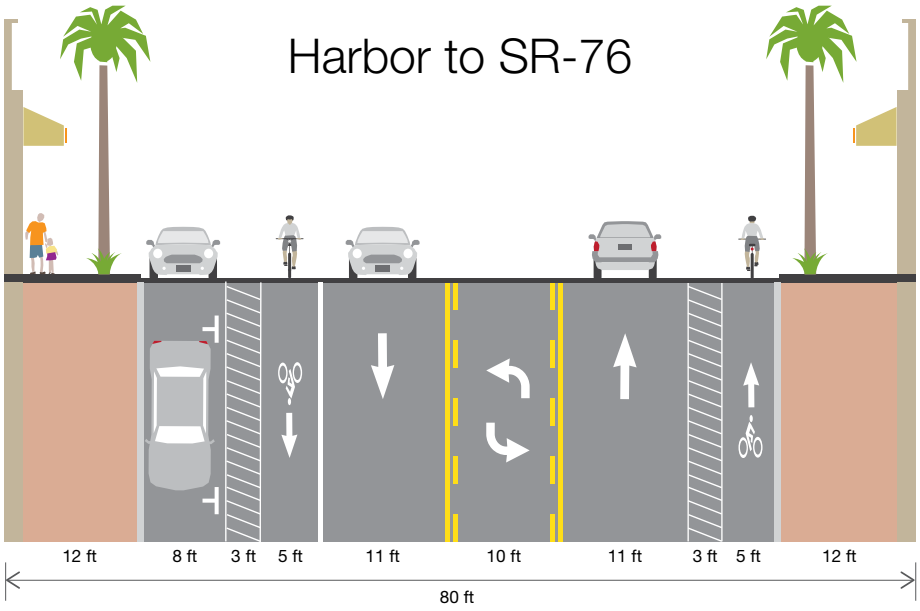
Legend

- Project Intersections

Figure 2-2 Segment 1 – Project Cross Sections







Legend

- Traffic Signal
- Roundabout
- 2 Lanes
- 2 Southbound Lanes

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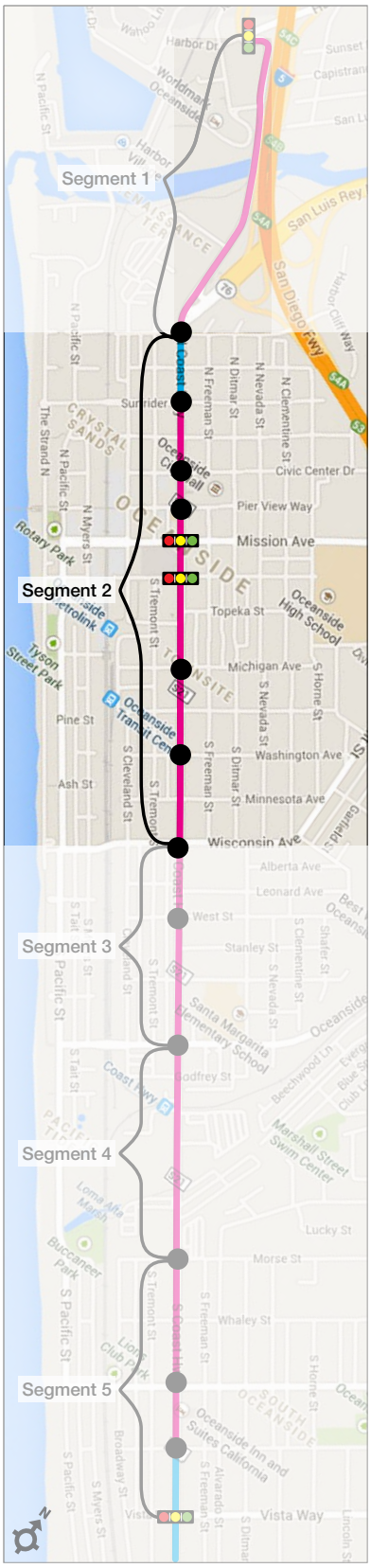
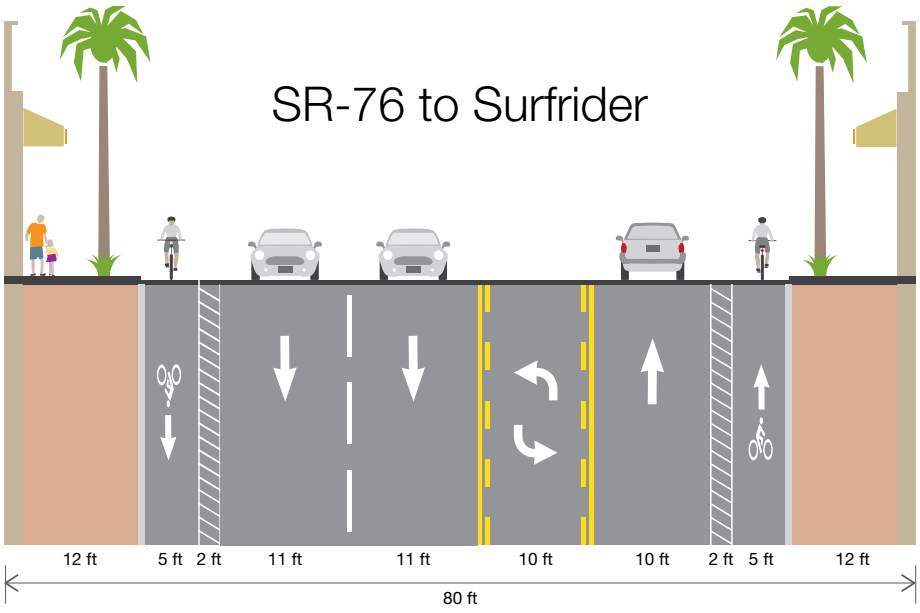
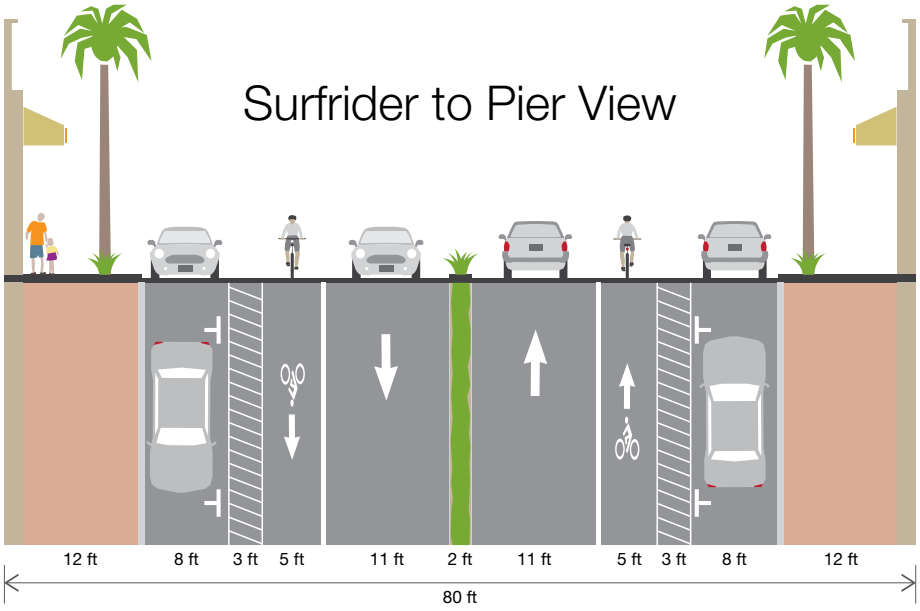
Figure 2-3a Segment 2 – Project Cross Sections



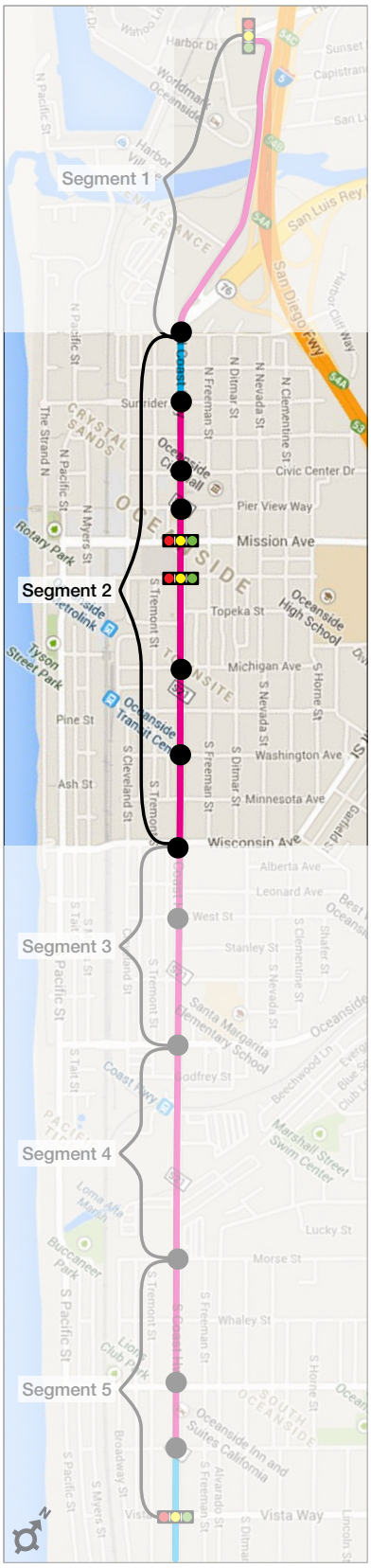


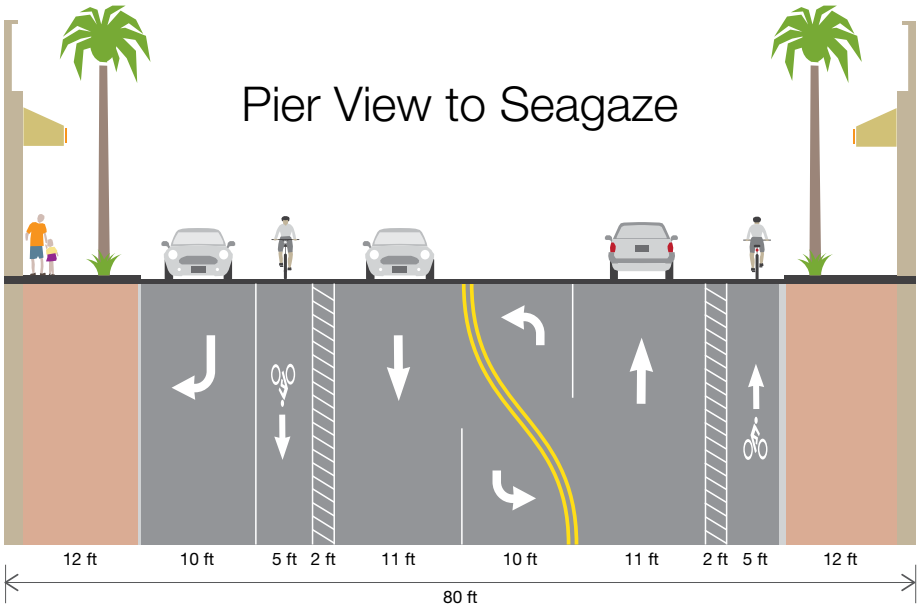


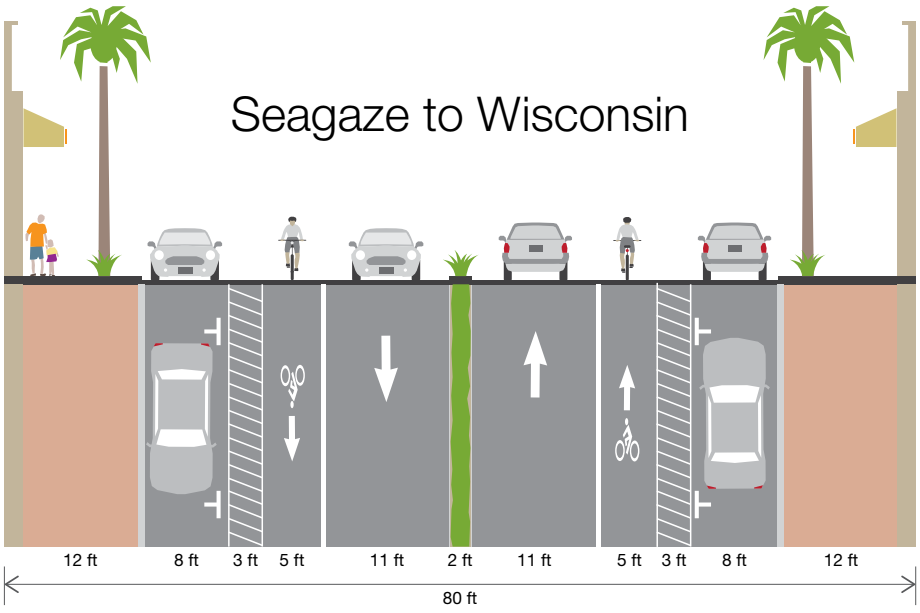
Legend

- Traffic Signal
- Roundabout
- 2 Lanes
- 2 Southbound Lanes

Figure 2-3b Segment 2 – Project Cross Sections



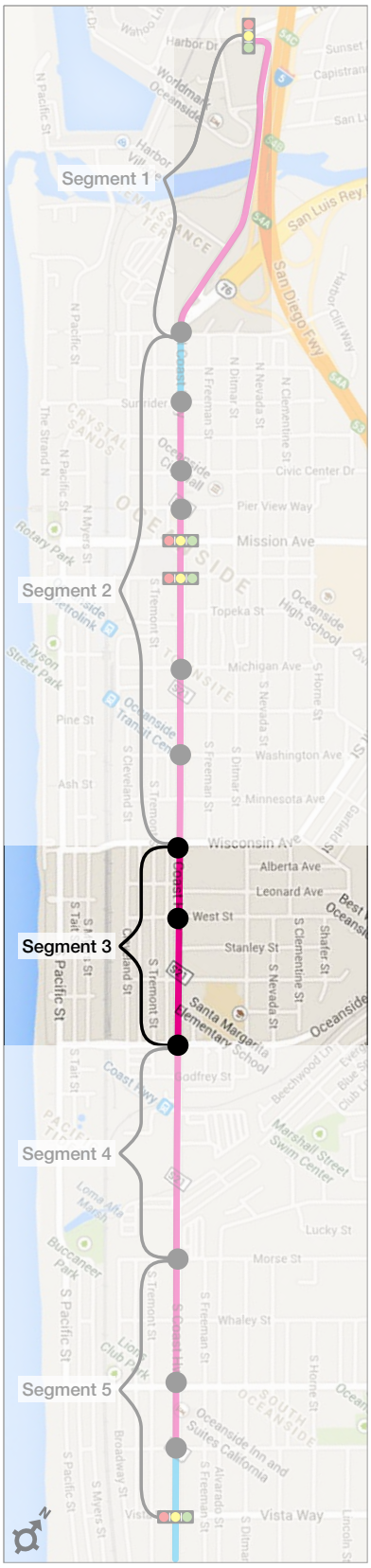


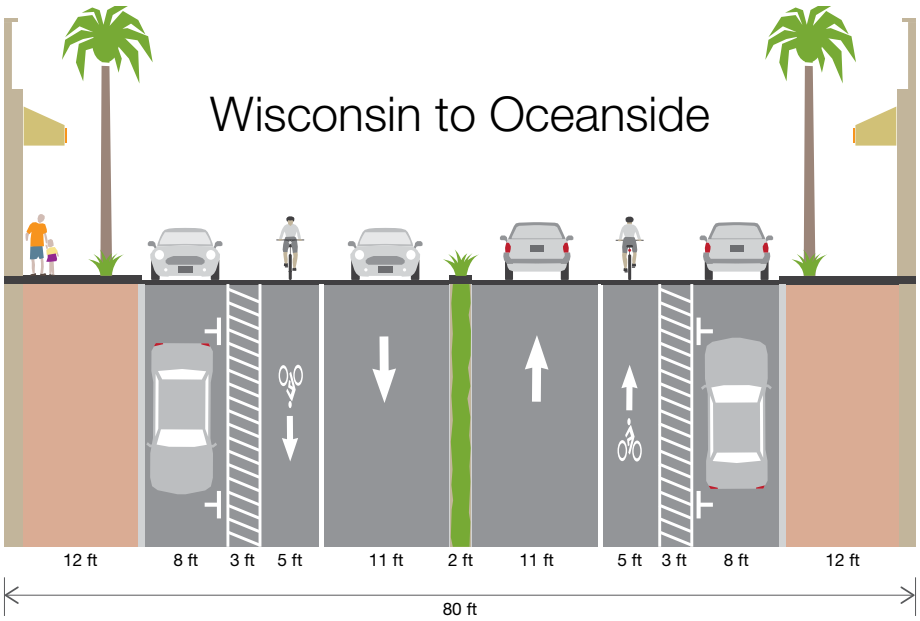


Legend

- Traffic Signal
- Roundabout
- 2 Lanes
- 2 Southbound Lanes

Figure 2-4 Segment 3 – Project Cross Sections

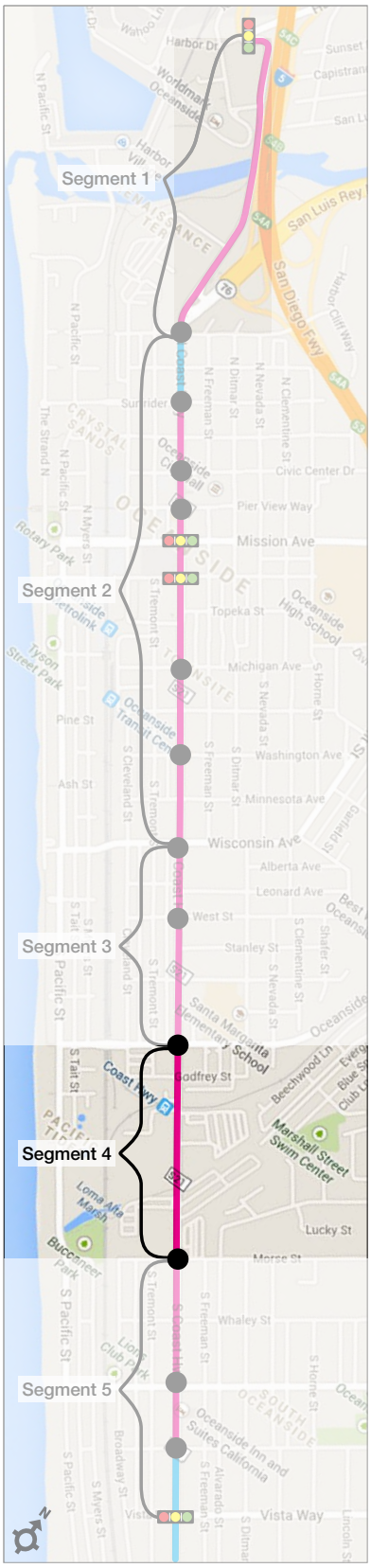


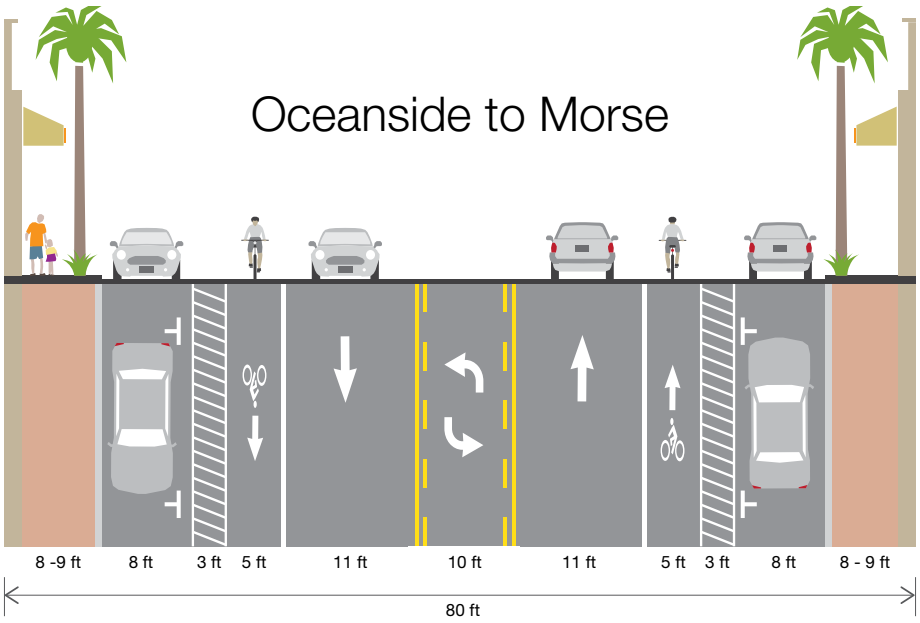


Legend

- Traffic Signal
- Roundabout
- 2 Lanes
- 2 Southbound Lanes

Figure 2-5 Segment 4 – Project Cross Sections

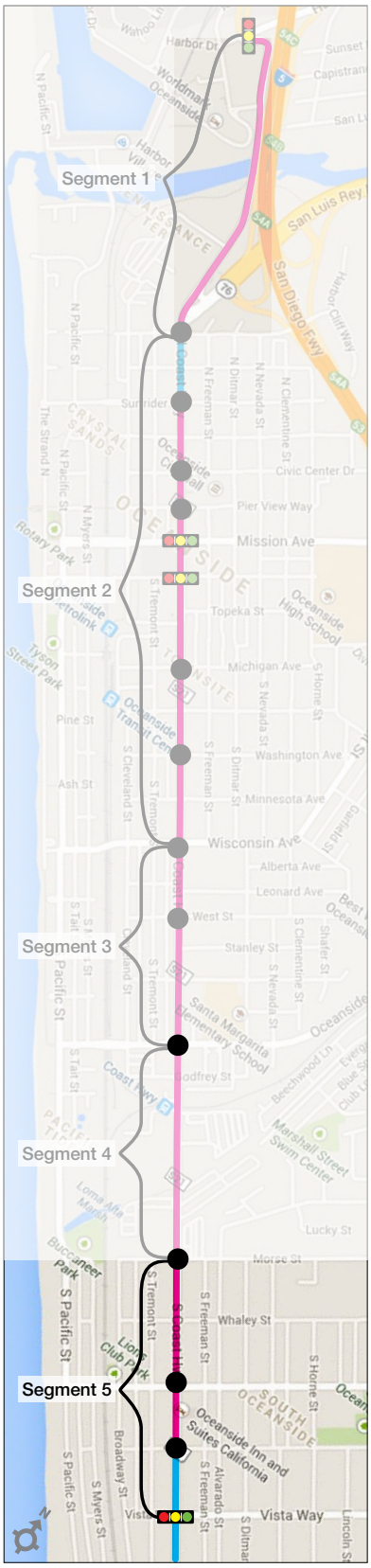


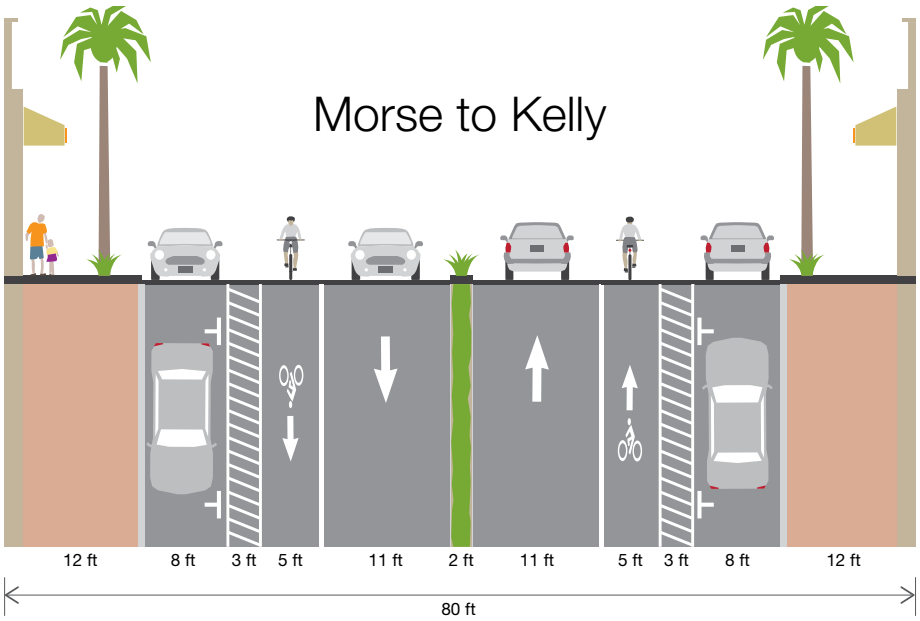


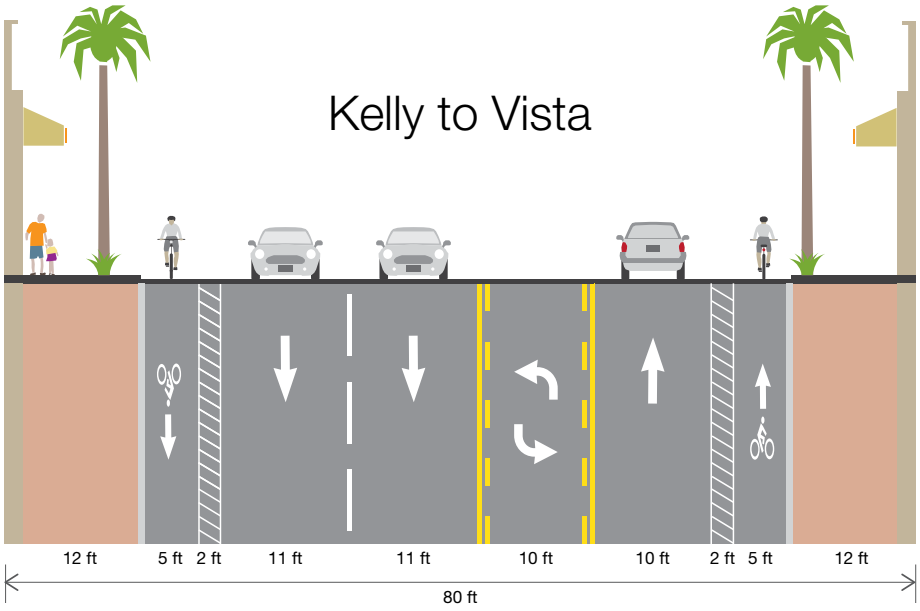
Legend

- Traffic Signal
- Roundabout
- 2 Lanes
- 2 Southbound Lanes

Figure 2-6 Segment 5 – Project Cross Sections







Legend

- Traffic Signal
- Roundabout
- 2 Lanes
- 2 Southbound Lanes

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3 Analysis Methodology

The purpose of this TIA is to analyze the potential circulation impacts associated with the Coast Highway Corridor Study. The traffic analysis examines the following scenarios:

- Existing 2013 Conditions No Project
- Existing 2013 Conditions with Project
- Existing 2013 Conditions with Project Alternative 1 (four traffic lanes between Oceanside Blvd and Vista Way)
- Existing 2013 Conditions with Project Alternatives 2 (four traffic lanes between Morse St and Vista Way)
- Existing 2013 Conditions with Project Alternative 3 (four traffic lanes between Morse Street and Vista Way)
- Future 2035 Conditions No Project – General Plan Land Use
- Future 2035 Conditions with Project – Modified Vision Plan Land Use
- Future 2035 Conditions with Project Alternative 1 (four traffic lanes between Oceanside Blvd and Vista Way) – Modified Vision Plan Land Use
- Future 2035 Conditions with Project Alternative 2 (four traffic lanes between Morse St and Vista Way) – Modified Vision Plan Land Use
- Future 2035 Conditions with Project Alternative 3 (four traffic lanes between Morse Street and Vista Way) – Modified Vision Plan Land Use north of Morse St and General Plan Land use South of Morse St

The existing condition scenario analysis sets the existing condition baseline. The second, third, fourth, and fifth scenarios (project, project alternative 1, project alternative 2, and project alternative 3) allow for the analysis of existing traffic conditions with the proposed project and three project alternative lane configurations. The future baseline analysis evaluates future year 2035 under general plan condition. The future with project and with project alternative analyses evaluate future year 2035 under a modified Vision Plan land use condition with project and the three project alternative lane configurations.

Traffic operations at study intersections are evaluated for the AM and PM peak hours for each of the scenarios identified above. The peak hours are defined by the hour with the highest traffic volumes over a two hour period, typically between 7AM and 9AM in the morning and between 4PM and 6PM in the evening.

A detailed description of the methodology utilized in this TIA is presented below.

3.1 Traffic Count Data

Existing peak hour intersection count data and 48-hour roadway segment volumes were collected at the selected intersections and roadway segments in the study area during the summer (August) of 2013. Intersections 46 and 47 was not part of the original 2013 counts. In order to provide a more consistent and complete analysis, intersections 46 and 47 was added to

the study in 2016. Therefore, existing turning movement counts are not available for those two study intersections. The 2013 traffic counts are not anticipated to be considerably different compared to 2016 conditions as traffic is typically the highest during the summer months and thus captures a conservative representation of 2013 traffic conditions. Further, new private development along Coast Highway in the three years between the 2013 counts and 2016 has primarily been limited to adaptive reuse of existing buildings with some new construction of restaurants and breweries. These uses do not typically generate their peak number of automobile trips with the peak hour of adjacent street traffic, reducing the potential impact of these new developments on existing peak hour traffic volumes. It is important to note future Year 2035 traffic conditions (see below) utilize the San Diego Association of Government (SANDAG) forecast model and are independent from existing traffic volumes.

The existing intersection turning movement counts for the Caltrans interchanges were taken manually on Tuesday, March 13, 2018 during the morning peak period (7:00 AM to 9:00 AM) and the afternoon peak period (4:00 PM to 6:00 PM). The detailed traffic count data for the study area intersections and interchanges can be found in Appendix C.

3.2 Traffic Forecasting

Roadway segment volumes for 2035 conditions were provided by the San Diego Association of Governments (SANDAG) forecast model runs using the general plan and modified vision plan land uses. The SANDAG Series 12 model version was utilized to develop the future forecast traffic volumes.

The turning movement volumes at study intersections are based on existing turning movements and projected Average Daily Traffic (ADT) volumes along each approach.[4] Each turning movement was derived using an iterative method that balanced the inflows and outflows for each approach. A more detailed description of the methodology used to forecast turning movement volume is contained in the National Cooperative Highway Research Program (NCHRP) 255 Highway Traffic Data for Urbanized Area Project Planning and Design, Chapter 8.

3.3 Trip Generation

Based on existing land uses and the SANDAG forecast model runs, existing and future trips were estimated for study area.[5] Trip rates were based on the ITE Trip Generation Manual (9th Edition) and applied to existing and future land uses. The results of this comparison are found in Appendix B. A comparison of the two scenarios provides an estimate of trips generated between existing and future scenarios.

3.4 Vehicle Miles Traveled

Senate Bill (SB) 743 was passed by the State Legislature and signed by Governor Brown in 2013. This bill created a process to change the manner in which transportation impacts are analyzed under the California Environmental Quality Act (CEQA). Since the passage of SB 743, the State Office of Planning and Research has been working to identify the preferred approach going forward to analyze transportation impacts. The current proposal involves the use of Vehicle Miles Traveled (VMT) as the primary metric for determining transportation impact across the state. Further, the proposal states that land use development near transit or in VMT-efficient areas should be presumed to cause a less than significant transportation impact and that transit,

[4] Existing turning movement was not available for intersections 46 and 47; assumed a 1-2-1 turning movement split to calculate future movements. A 1-2-1 split provides a base allocation of turning movement volumes for the development of future forecast turning movements. In this case, the first 1 represents left turns, the 2 would be through movements, and the second 1 would be right turns. This is rule-of-thumb industry guideline for use at intersections with no available turning movement counts.
[5] Existing land uses are based on the Coast Highway Land Use Review (May 2015)

active transportation and rehabilitation projects that do not add motor vehicle capacity should also be presumed to cause a less than significant impact.

Vehicle Miles Traveled (VMT) is derived from travel patterns extracted from the SANDAG forecast model. This analysis was completed by SANDAG for the future year 2035 under general plan land use conditions (no project) and future year 2035 under a modified vision plan land use conditions (with project). VMT was extracted from SANDAG's model to provide a consistent platform for comparison between the modified vision plan (project scenario) and the general plan (no project scenario) land uses. The VMT analysis was conducted for all trips within, beginning, or ending within the project study area. The results of the VMT analysis are presented in Section 6. VMT data is presented both in terms of total VMT and VMT per capita for the study area west of Interstate 5.

3.5 Level of Service Analysis and Criteria

This section presents the methodology used to perform the traffic analysis, consistent with the City of Oceanside General Plan Circulation Element. The methodology used to assess the operation of signalized and unsignalized intersections is the Highway Capacity Manual (HCM) methodology. HCM methodology presents level of service (LOS) in terms of control delay in seconds per vehicle, which is defined as the average delay experienced at the traffic intersection. The minimum acceptable level of service established by the Circulation Element of the City of Oceanside General Plan is defined as LOS D for intersections during peak hour operations. Intersections that are maintained and operated by Caltrans were analyzed using the HCM 2010 methodology and the analysis was conducted consistent with Caltrans traffic study guidelines. Caltrans traffic study guidelines establish the transition between LOS C and D as the minimum acceptable LOS for Caltrans facilities.

3.5.1 Roadway Segment Operations

Roadway segment performance is based on the capacity of the facility (as determined by the functional classification, roadway geometrics, and number of through lanes) and the ADT volumes. The City of Oceanside General Plan Circulation Element evaluates roadway segment performance in terms of Level of Service (LOS), where the thresholds for each LOS grade are based on daily volume-to-capacity (v/c) ratios. LOS designations are based on a volume-to-capacity ratio, and range from "A" to "F" with LOS A representing the lowest level of congestion and LOS F representing extremely congested and restricted operations. The goal is to provide the right balance of paved roadway to serve the surrounding uses with an acceptable amount of peak period delay. The maximum average daily volumes for each street classification and lane configuration and the corresponding LOS are summarized in Table 3-1.

It should be noted the County of San Diego Public Road Standards were used to evaluate roadway capacities for the corridor along Coast Highway. These standards were used to supplement the existing City standards for the corridor roadways as the standards provide a more accurate assessment of daily roadway capacity based on the proposed project elements with a two-lane divided roadway and roundabouts. Given this proposed roadway condition and the capacity benefits provided by the raised median and roundabouts, the existing City standards for a two-lane collector roadway were deemed to be too conservative. A collector roadway with a raised median is included as a roadway type and follows the LOS thresholds outlined in Table 3-1.

Table 3-1: Roadway Classification Level of Service (LOS) & Capacity

Class	Lanes	Capacity (Daily Vehicles)				
		LOS A	LOS B	LOS C	LOS D	LOS E
Expressway	6	30,000	42,000	60,000	70,000	80,000
Expressway	4	25,000	35,000	50,000	55,000	60,000
Prime Arterial	6	25,000	35,000	50,000	55,000	60,000
6-Lane Major Arterial	6	20,000	28,000	40,000	45,000	50,000
5-Lane Major Arterial	5	17,500	24,500	35,000	40,000	45,000
4-Lane Major Arterial	4	15,000	21,000	30,000	35,000	40,000
Secondary Collector (4 lanes with 2-way left turn lane)	4	10,000	14,000	20,000	25,000	30,000
Secondary Collector (4 lanes without 2-way left-turn lane, with left turn pockets)	4	9,000	13,000	18,000	22,000	25,000
Collector (commercial fronting, 2-lanes with 2-way left turn lane)[1]	2	5,000	7,000	10,000	13,000	15,000
Collector (residential streets in the Circulation Element or industrial fronting)	2	4,000	5,500	7,500	9,000	10,000
Local Street (residential streets NOT in the Circulation Element)	2	—	—	2,200	—	—
Community Collector (w/ Raised Median)[2]	2	10,000	11,700	13,400	15,000	19,000

1. This capacity will also be assumed for two-lane one-way collectors.
2. Source: County of San Diego Public Road Standards, March 2012

A roadway segment analysis, consistent with the City of Oceanside's Traffic Study Guidelines, is provided in the Appendix A of this traffic impact analysis report. The roadway segment analysis was completed for each study alternative and includes analysis of existing and forecast Average Daily Traffic (ADT) traffic volumes for various road segments located throughout the traffic study area. A peak hour roadway segment level of service (LOS) analysis was also completed for the same roadway segment locations. The city's Circulation Element requires that if a roadway is calculated to operate at LOS E on an average daily basis, then an arterial peak hour analysis should be performed following the (most recent version of) the Highway Capacity Manual (HCM) methodology. The peak hour roadway segment analysis**,** together with the daily analysis was completed to satisfy this requirement.

The roadway segment analysis did identify segments of Coast Highway that are forecast to operate at LOS E or F on an average daily basis in the Future With Project conditions. In these cases, the City of Oceanside requires that projects implement mitigation measures intended to enhance traffic operations and progression through the corridor during the peak traffic hours. These measures typically include installation of roundabouts, traffic signal timing or coordination enhancements, and minimizing conflicting traffic movements, etc. These measures are all part of the base Coast Highway Corridor project, which includes the installation of roundabouts throughout the corridor, specifically to enhance traffic flow, as well as elimination of traffic signals and the construction of a raised median in several sections of the roadway. These project elements are consistent with the City of Oceanside's Circulation Element levels of service (LOS) analysis methodology used to improve peak hour traffic flows along roadway segments. With the implementation of these project elements, level of service is projected to be acceptable on all study road segments and project alternatives in the peak hour.

3.5.2 Intersection Operations Analysis

3.5.2.1 Signalized Intersections

The HCM 2000 methodology defines LOS as a qualitative measure that describes operational conditions within a traffic stream, generally in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. The criteria used to evaluate LOS conditions vary based on the type of roadway and whether the traffic flow is considered interrupted or uninterrupted. The six qualitative categories of LOS and corresponding average delay that have been defined are presented below:

Table 3-2: Level of Service for Signalized Intersections

LOS	Description	Delay (sec)
A	No approach phase is fully utilized by traffic, and no vehicle waits longer than one red indication. Typically, the approach appears quite open, turns are made easily, and nearly all drivers find freedom of operation.	0.0 -10.0
B	This service level represents stable operation, where an occasional approach phase is fully utilized, and a substantial number are nearing full use. Many drivers begin to feel restricted within platoons of vehicles.	10.1 – 20.0
C	This level still represents stable operating conditions. Occasionally, drivers may have to wait through more than one red signal indication, and backups may develop behind turning vehicles. Most drivers feel somewhat restricted, but not objectionably so.	20.1 – 35.0
D	This level encompasses a zone of increasing restriction approaching instability at the intersection. Delays to approaching vehicles may be substantial during short peaks within the peak period; however, enough cycles with lower demand occur to permit periodic clearance of developing queues, thus preventing excessive backups.	35.1 – 55.0
E	Capacity occurs at the upper end of this service level. It represents the most vehicles that any particular intersection approach can accommodate. Full utilization of every signal cycle is attained no matter how great the demand.	55.1 – 80.0
F	This level describes forced flow operations at low speeds, where volumes exceed capacity. These conditions usually result from queues of vehicles backing up from a restriction downstream. Speeds are reduced substantially, and stoppages may occur for short or long periods of time due to the congestion. In the extreme case, speed can drop to zero.	80.1 or more

Source: Highway Capacity Manual (2010)

3.5.2.2 Unsignalized Intersections

The two types of unsignalized intersections include side-street stop controlled (SSSC) and all-way stop-controlled (AWSC). The delay range for unsignalized intersections is different from those of signalized intersections primarily due to driver expectation. The expectation is that signalized intersections are designed to carry higher volumes of traffic and therefore higher levels of delay are acceptable. The HCM 2000 methodology estimates the delay based on the worse approach at unsignalized intersections. The table below includes the LOS ranges for both unsignalized intersection types.

Table 3-3: Level of Service for Unsignalized Intersections

Level of Service	Description	Control Delay (sec/veh)
A	Little or no delays	0.0 – 10.0
B	Short traffic delays	10.1 – 15.0
C	Average traffic delays	15.1 – 25.0
D	Long traffic delays	25.1 – 35.0
E	Very long traffic delays	35.1 – 50.0
F	Extreme traffic delays with intersection capacity exceeded	50.1 or more

Source: Highway Capacity Manual (2010)

3.5.2.3 Roundabouts and Interchanges

Roundabouts were evaluated using the HCM 2010 methodology utilizing the Highway Capacity Software 2010 (HCS 2010). HCM 2010 methodology evaluates LOS based on vehicle delay. LOS designations at roundabouts will follow the same criteria as designations for unsignalized intersections.

Caltrans assesses facility performance and impacts utilizing the HCM 2010 method. Facilities evaluated with this method include freeway terminals (intersections), on-ramps, and off-ramps (queues). The Synchro 9 software was used to implement this method. Standard settings were utilized. Caltrans traffic impact analysis guidelines do not explicitly define a significant impact in terms of existing level of service and change in that level of service; therefore, a significant impact is considered to occur when:

- The addition of project trips causes a change from LOS C or better to LOS D; or
- The addition of project trips causes a change from LOS D or worse to degrade to a lower LOS.
- If the intersection is operating at LOS F in the baseline condition, any increase in vehicle delay is taken to be an impact; LOS should be returned to, at least, the pre-project conditions.

LOS designations at ramp interchanges will follow the same criteria as designations for signalized intersections. The HCM methodology was used to analyze the study ramp intersections under Caltrans' jurisdiction. The intersection at Mission Avenue and the I-5 on-ramp is an uncontrolled intersection and was, therefore, not included in the analysis.

3.6 Roadway System

The circulation network considered for analysis consists of streets in the vicinity of the Coast Highway Corridor Study. This network includes the following roadways:

- Coast Highway
- Pacific Street
- Cleveland Street
- Broadway Street
- Tremont Street
- Freeman Street
- Ditmar Street
- Stewart Street
- State Route 76 (SR-76)
- Surfrider Way
- Civic Center Drive
- Pier View Way
- Mission Avenue
- Seagaze Street
- Missouri Avenue
- Washington Avenue
- Wisconsin Avenue
- Oceanside Boulevard

- Morse Street
- Cassidy Street
- Vista Way

Coast Highway – Runs north/south through Oceanside's downtown area, and has two typical sections within the City. The first section is a collector two-lane roadway with a continuous two-way left turn lane that spans from Harbor Drive to the intersection with SR-76. No on-street parking is allowed on most of the segment except for a small stretch just south of Harbor Drive. South of the SR-76, Coast Highway becomes a secondary collector and is generally built to secondary collector standards (as a four-lane undivided roadway). Between SR-76 and Wisconsin Avenue, the posted speed limit is 25 miles per hour, and south of Wisconsin, the speed limit increases to 35 miles per hour. Parking is not allowed on Coast Highway between SR-76 and Surfrider Way, from Oceanside Boulevard to Morse Street, and south of Vista Way, but is allowed in some sections between Surfrider Way and Oceanside Boulevard, and between Morse Street and Vista Way. Between Oceanside Boulevard and Morse Street and south of Vista Way, there is a striped bike lane on each side of the roadway.

Pacific Street – A collector roadway located west of Coast Highway. This street runs parallel to Coast Highway between Harbor Drive and Eaton Street. Pacific Street is a two-lane undivided roadway with on-street parking permitted on all segments. It is also designated as a bike route and has bike sharrows[6] marked throughout the corridor.

Cleveland Street – A collector roadway located east of Pacific Street. Cleveland Street is interrupted between Seagaze Street and Michigan Avenue in the area occupied by the Oceanside Transit Station. Cleveland Street continues south of Missouri Avenue ending at Godfrey Street. This street is a two-lane undivided roadway.

Broadway Street – A collector that runs from Morse Street to Eaton Street. Broadway Street is a two-lane undivided roadway located west of Coast Highway and permits parking. The Coastal Rail Trail runs adjacent to Broadway Street from Cassidy Street to Vista Way.

Tremont Street – A local street located between Coast Highway and Cleveland Street. This street is a two-lane undivided roadway with parking allowed on all segments of the street. Tremont Street is a designated bike route from Missouri Avenue to Wisconsin Avenue.

Freeman Street – A local street located east of Coast Highway. This street is a two-lane undivided roadway with on-street parking permitted on all segments. Freeman Street is interrupted between Civic Center Drive and Pier View Way (area occupied by Oceanside's Civic Center) and between Wisconsin Avenue and Morse Street (with one block between Oceanside Boulevard and Godfrey Street). The last segment of Freeman Street is from Morse Street to Eaton Street.

Ditmar Street – Designated as a collector roadway from Missouri Avenue to Eucalyptus Street and a local street north of Missouri Avenue and south of Eucalyptus Street. Ditmar Street is a two-lane undivided roadway located east of Freeman Street and permits parking. Ditmar Street is interrupted south of Oceanside Boulevard, restarts at Morse Street and ends at Eaton Street.

Stewart Street – A local street located east of Ditmar Street. This street is a two-lane undivided roadway. Stewart Street runs parallel to Coast Highway between Laguna Street and Vista Way.

State Route 76 (SR-76) – This is a State Highway located east of the study area, connecting to Coast Highway in the northern portion of the City. East of Coast Highway, SR-76 starts as a four-lane undivided roadway, becoming a four-lane divided roadway in the proximity of the interchange with Interstate 5.

Surfrider Way – A collector street located south of the intersection of Coast Highway and SR-76. East of Coast Highway, Surfrider Way is a two-lane undivided roadway. West of Coast Highway,

[6] Bike Sharrow – Road marking used to indicate a shared lane environment for bicycle and automobiles

the street is two-lane roadway divided by a landscaped median from Coast Highway to the rail tracks, and a two-lane undivided roadway from the rail tracks to the beach. Parallel on-street parking is allowed on Surfrider Way, with the exception of the block closest to the beach.

Civic Center Drive – A collector street located south of Surfrider Way, running from Cleveland Street to beyond the eastern limit of the study area. This street is a two-lane undivided roadway. Parallel parking is allowed on all segments of the street within the study area limits, with the exception of the south side of Civic Center Drive east of Coast Highway. Diagonal on-street parking is provided in this section of the roadway.

Pier View Way – A local street located south of Civic Center Drive, and runs from Cleveland Street to Horne Street. This street is a two-lane undivided roadway. Parking is allowed on all segments of the street, and diagonal parking is allowed on the segment between Cleveland Street and Ditmar Street.

Mission Avenue – A collector roadway that connects the Coast Highway corridor and beach area with portions of the city located east of Interstate 5. Mission Avenue is part of a one-way couplet with Seagaze Street and includes bicycle sharrows.

Seagaze Street – A two-lane collector roadway located south of Mission Avenue. Parallel parking is allowed on most parts of the street, with diagonal parking allowed on a portion of the north side of the street between Cleveland Street and Coast Highway and on the south side of the street between Coast Highway and Freeman Street. Seagaze Street is part of a one-way couplet with Mission Avenue and includes a striped eastbound bicycle lane.

Missouri Avenue – A local street located south of Michigan Avenue. This street begins at Cleveland Street and crosses the study area, ending at Vine Street. This street is a two-lane undivided roadway with parking permitted.

Washington Avenue – A local street located south of Missouri Avenue. This street begins at Cleveland Street and crosses the majority of the study area, ending at Grant Street. This street is a two-lane undivided roadway. Parking is allowed.

Wisconsin Avenue – A collector street located south of Washington Avenue. This street begins at The Strand and crosses the majority of the study area, ending at Weitzel Street. This street is a two-lane undivided roadway. On-street parking is allowed east of Pacific Street.

Oceanside Boulevard – A collector street located south of Wisconsin Avenue. It begins at Pacific Street, crosses the study area and continues east outside the study area boundaries. It provides access to industrial, residential, and retail/commercial uses. West of Coast Highway, Oceanside Boulevard is a two-lane undivided collector street, and parallel on-street parking is permitted. Between Coast Highway and I-5, Oceanside Boulevard is designated a secondary collector with four lanes, an undivided median and a striped bicycle lane.

Morse Street – A two-lane undivided collector street located south of Oceanside Boulevard and south of the Sprinter rail corridor. This street begins at Broadway Street and crosses the study area, ending at Griffin Street. On-street parking is allowed.

Cassidy Street – A collector street that begins at Broadway Street and crosses the study area from west to east, and continues east outside the study area boundaries. It is a two-lane undivided roadway. Parking is allowed on selected segments of the street. Bicycle sharrows are installed between Broadway and Ditmar Street.

Vista Way – Designated as a collector street. From Broadway Street to Coast Highway, it is a two-lane undivided roadway with parallel parking permitted. East of Coast Highway, Vista Way is a two-lane roadway with a continuous two-way center left turn lane. Parking is permitted from Broadway Street to the SR-78 ramps.

3.6.1 No Project Network

The no project network maintains existing roadway configurations and is the baseline for the Existing and Future analysis scenarios. These scenarios include a four lane Coast Highway corridor with two lanes of travel in each direction. The existing (no project) roadway configurations and intersection controls are shown in Figure 3-1.

3.6.2 Project Network

The project network includes full build out of the project and contains a two lane Coast Highway corridor with one lane of travel in each direction. A median divides the corridor throughout with roundabouts at twelve (12) intersections (listed below). The project roadway configurations and intersection controls are shown in Figure 3-2.

- Coast Hwy & SR-76
- Coast Hwy & Surfrider Way
- Coast Hwy & Civic Center Drive
- Coast Hwy & Pier View Way
- Coast Hwy & Michigan Ave
- Coast Hwy & Washington Ave
- Coast Hwy & Wisconsin Ave
- Coast Hwy & West St
- Coast Hwy & Oceanside Blvd
- Coast Hwy & Morse St
- Coast Hwy & Cassidy St
- Coast Hwy & Kelly St

3.6.3 Project Alternative 1 Network

The project alternative 1 network includes build out of the project from Harbor Drive to Oceanside Boulevard with a median divided two lane Coast Highway corridor with one lane of travel in each direction; roundabouts are located at seven (7) intersections (listed below). From Oceanside Boulevard to the southern city limits, Coast Highway corridor remains a four lane corridor with two lanes of travel in each direction. The project alternative 1 roadway configurations and intersection controls are shown in Figure 3-3.

- Coast Hwy & SR-76
- Coast Hwy & Civic Center Drive
- Coast Hwy & Pier View Way
- Coast Hwy & Michigan Ave
- Coast Hwy & Washington Ave
- Coast Hwy & Wisconsin Ave
- Coast Hwy & West St

3.6.4 Project Alternative 2 Network

The project alternative 2 network includes build out of the project from Harbor Drive to Morse Street with a median divided two lane Coast Highway corridor with one lane of travel in each direction; roundabouts are located at seven (7) intersections (listed below). From Morse Street to the southern city limits, Coast Highway corridor remains a four lane corridor with two lanes of travel in each direction. The project alternative 2 roadway configurations and intersection controls are shown in Figure 3-4.

- Coast Hwy & SR-76
- Coast Hwy & Civic Center Drive
- Coast Hwy & Pier View Way
- Coast Hwy & Michigan Ave
- Coast Hwy & Washington Ave
- Coast Hwy & Wisconsin Ave
- Coast Hwy & West St

3.6.5 Project Alternative 3 Network

The project alternative 3 network includes build out of the project from Harbor Drive to Morse Street with a median divided two lane Coast Highway corridor with one lane of travel in each direction; roundabouts are located at seven (7) intersections (listed below). From Morse Street to the southern city limits, Alternative 3 assumes that Coast Highway would remain as a four lane roadway with two lanes of travel in each direction. Further, this alternative assumes that the Incentive Overlay district would stop at Morse Street and future land uses south of Morse Street would be consistent with the SANDAG regional growth forecasts. The project alternative 3 roadway configurations and intersection controls are shown in Figure 3-5.

- Coast Hwy & SR-76
- Coast Hwy & Civic Center Drive
- Coast Hwy & Pier View Way
- Coast Hwy & Michigan Ave
- Coast Hwy & Washington Ave
- Coast Hwy & Wisconsin Ave
- Coast Hwy & West St

Figure 3-1a Existing (No Project) Roadway Configurations + Control

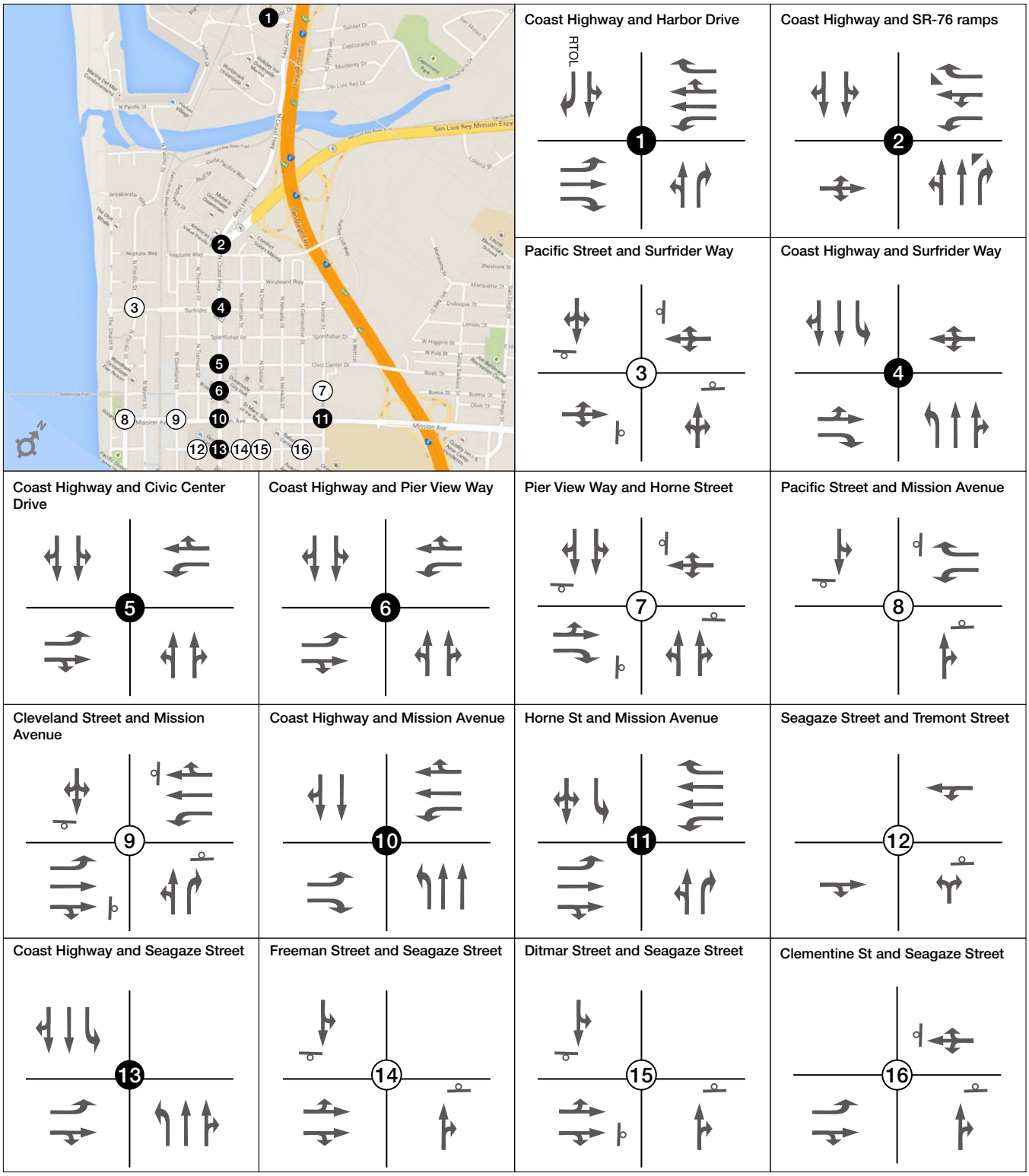


Figure 3-1b Existing (No Project) Roadway Configurations + Control

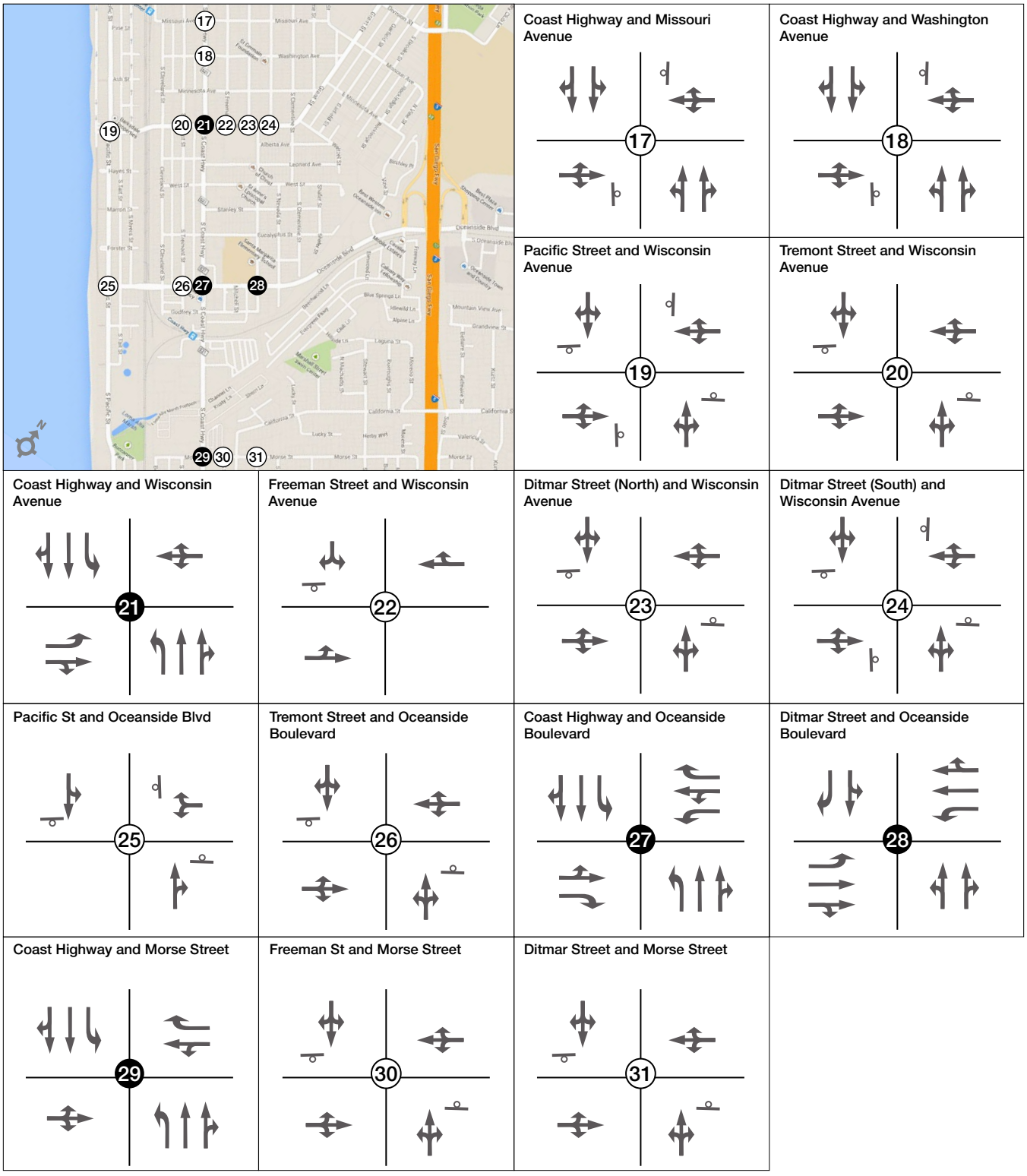
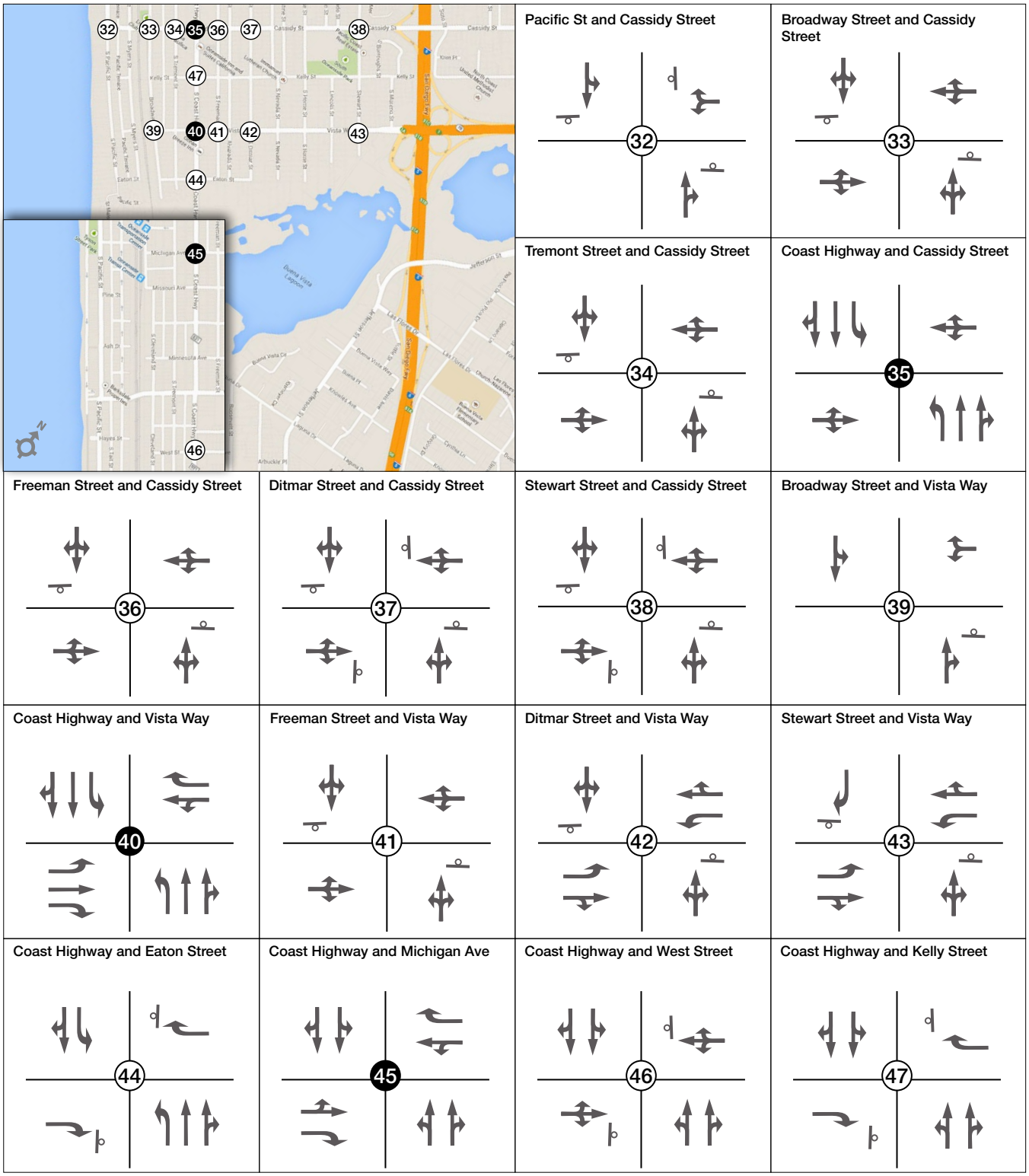


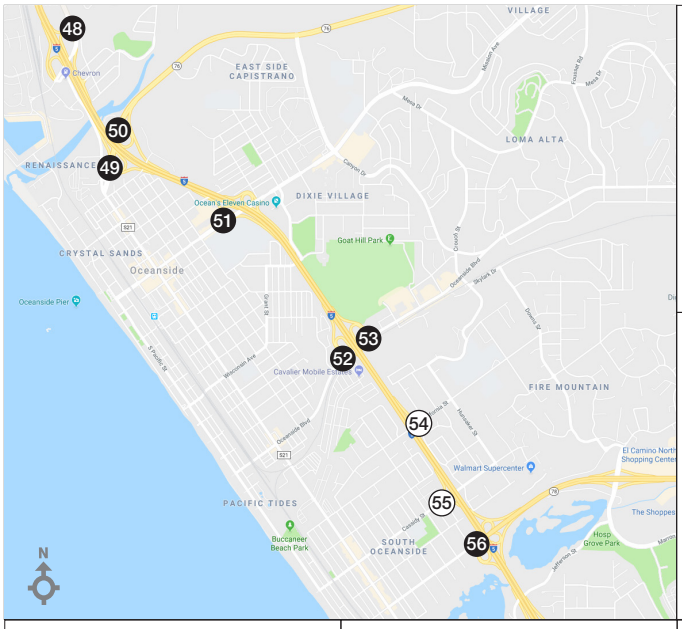
Figure 3-1c Existing (No Project) Roadway Configurations + Control



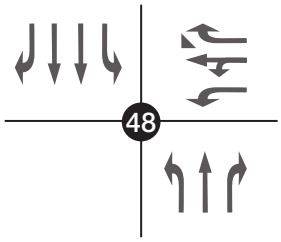
Legend

● Signalized Intersections ○ Unsignalized Intersections Free Right Turn Lane Stop Sign Control

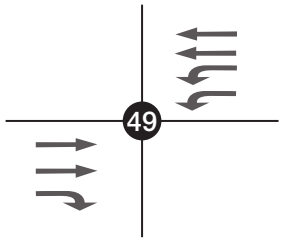
Figure 3-1d Existing (No Project) Roadway Configurations + Control



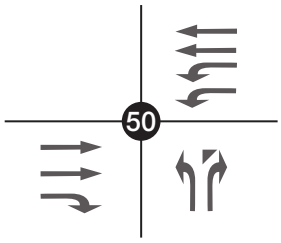
Vandergrift Boulevard and San Rafael Drive/I-5 NB On-Ramp



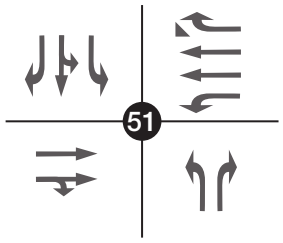
State Route 76 and I-5 SB On-Ramp



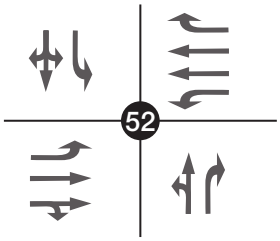
State Route 76 and I-5 NB On/Off-Ramp



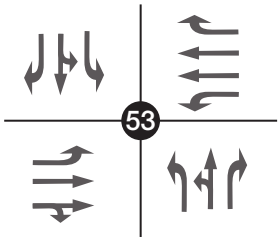
Mission Avenue and Pirates Cove Way/I-5 SB Off-Ramp



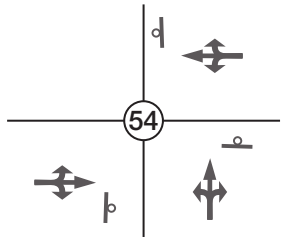
Oceanside Boulevard and I-5 SB On/Off-Ramp



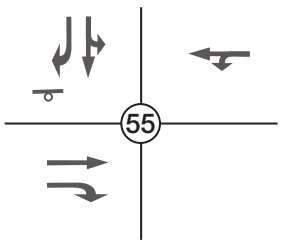
Oceanside Boulevard and I-5 NB On/Off-Ramp



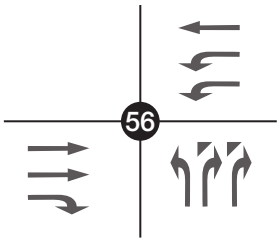
California Street and Soto Street/I-5 NB On-Ramp



Cassidy Street and I-5 SB On-Ramp/I-5 SB Off-Ramp



Vista Way and I-5 SB On/Off-Ramp



Legend

Signalized Intersections | Unsignalized Intersections | Free Right Turn Lane | Stop Sign Control

Figure 3-2a Project Roadway Configurations + Control

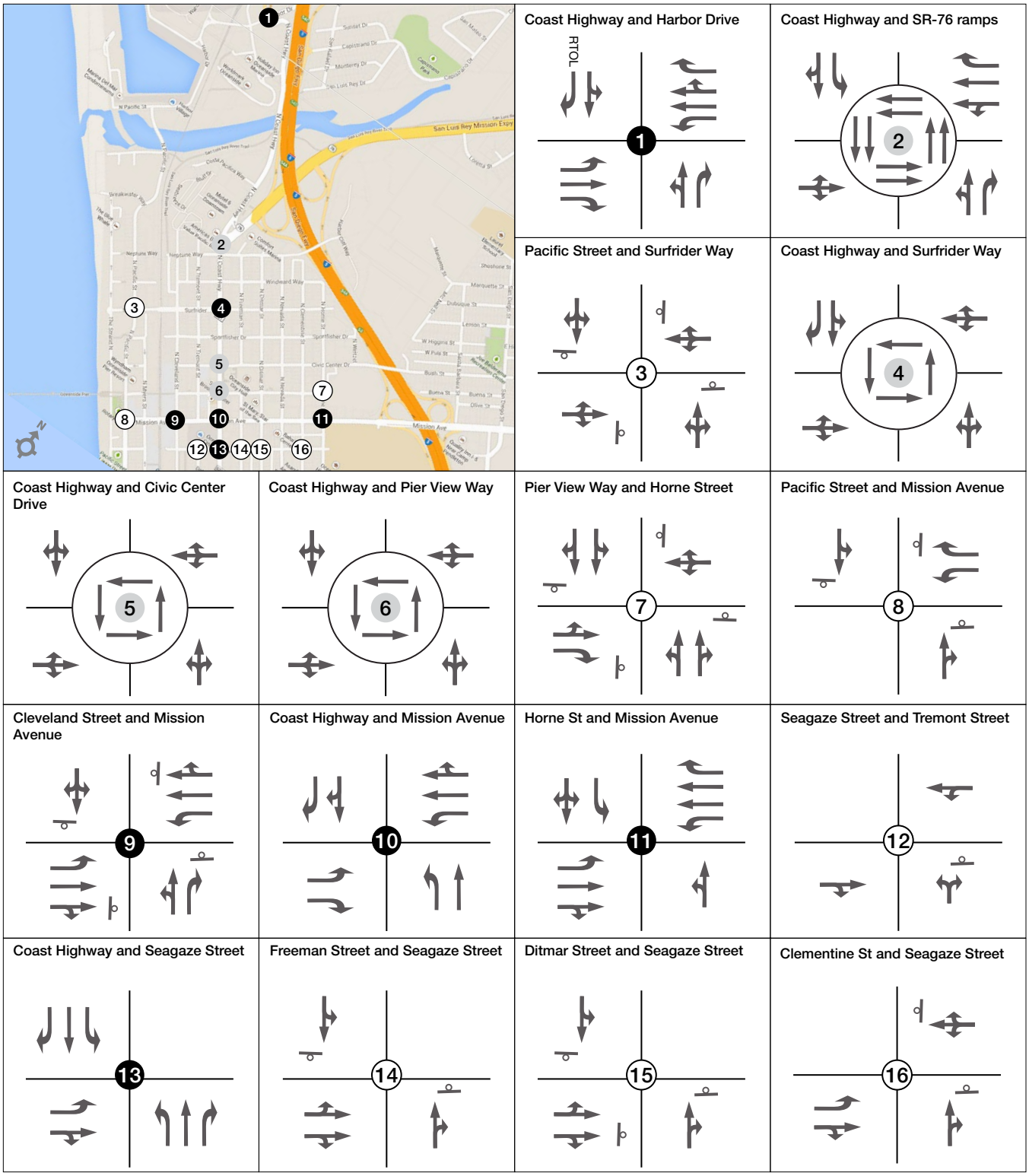


Figure 3-2b Project Roadway Configurations + Control

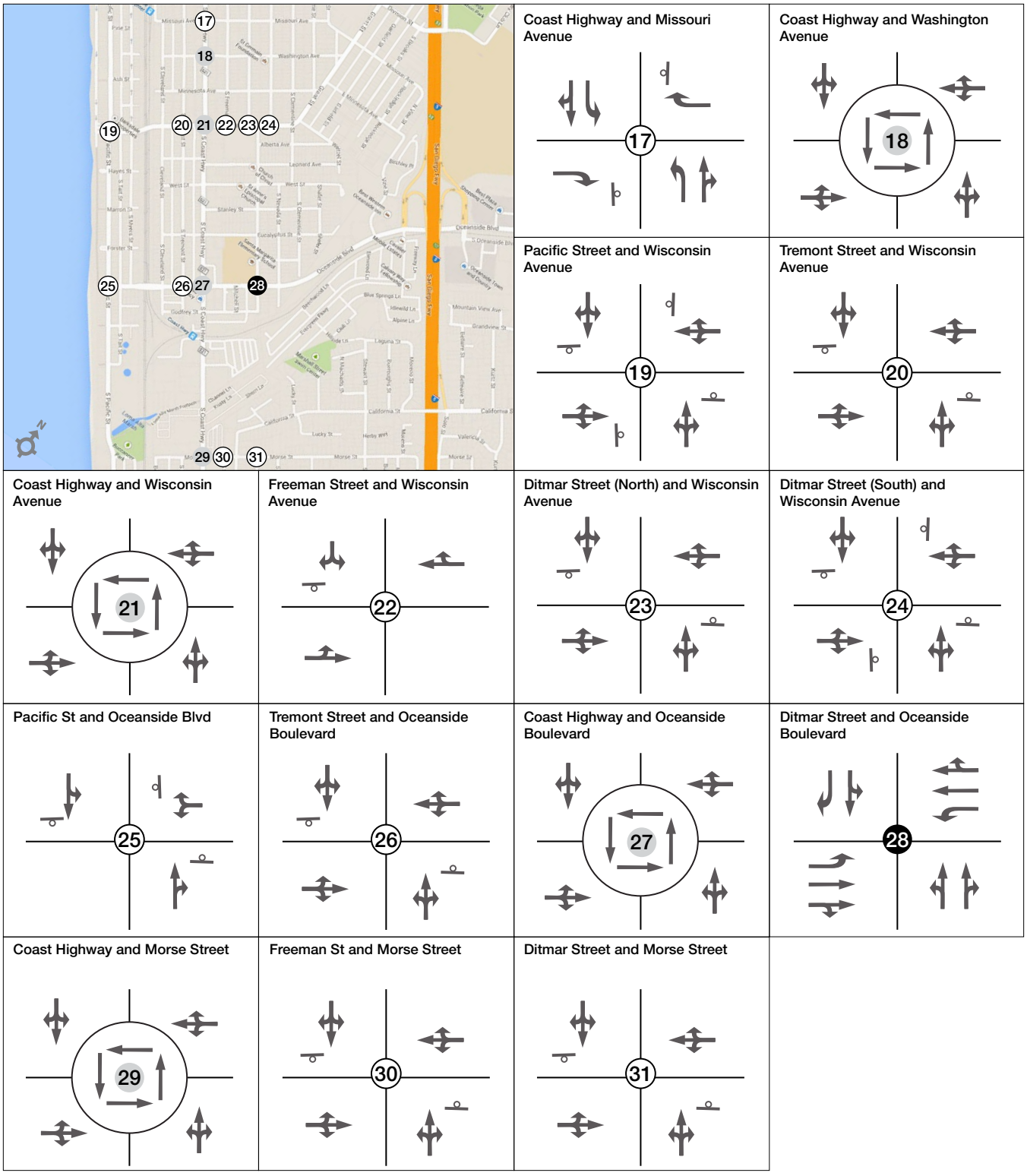
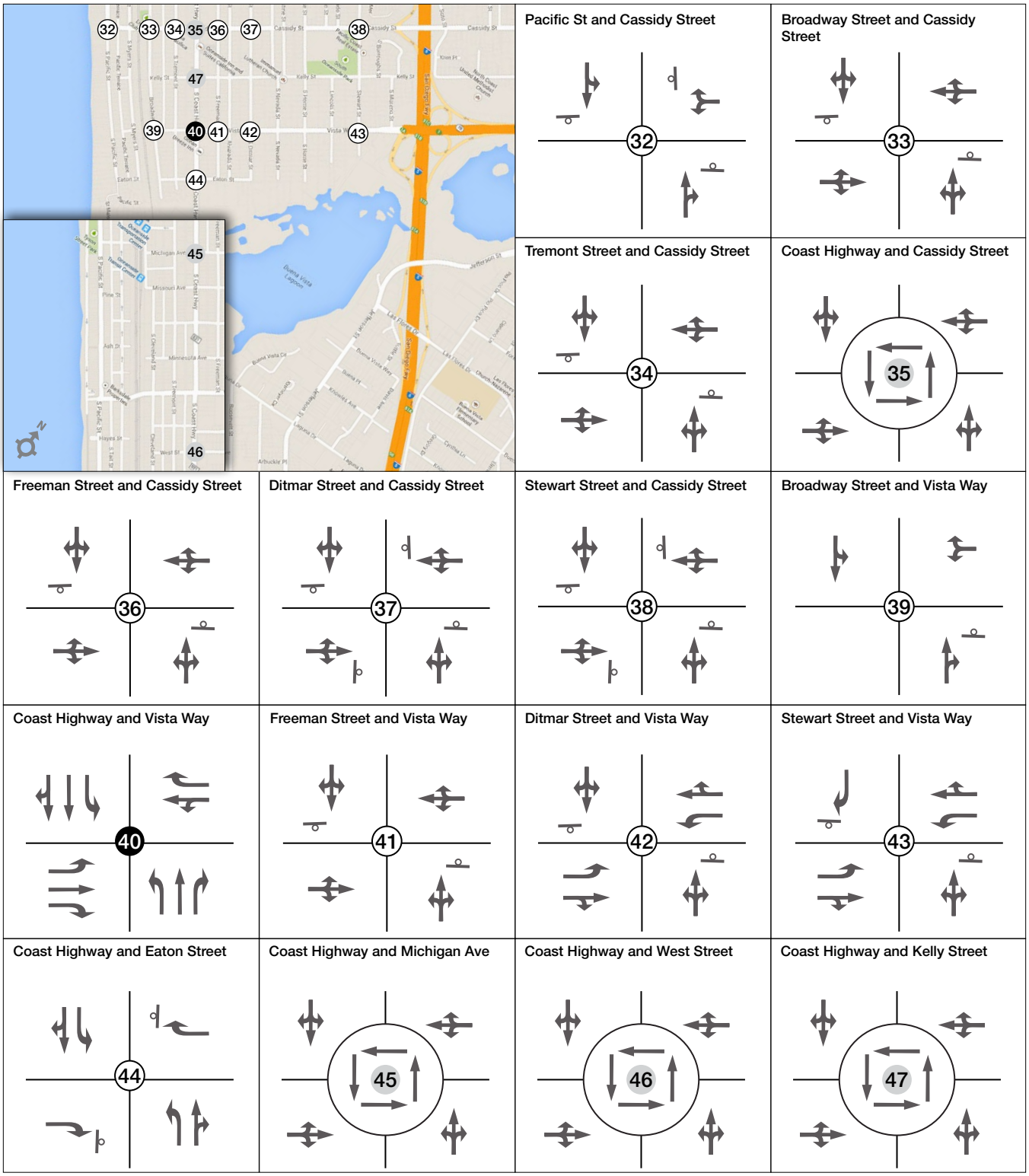


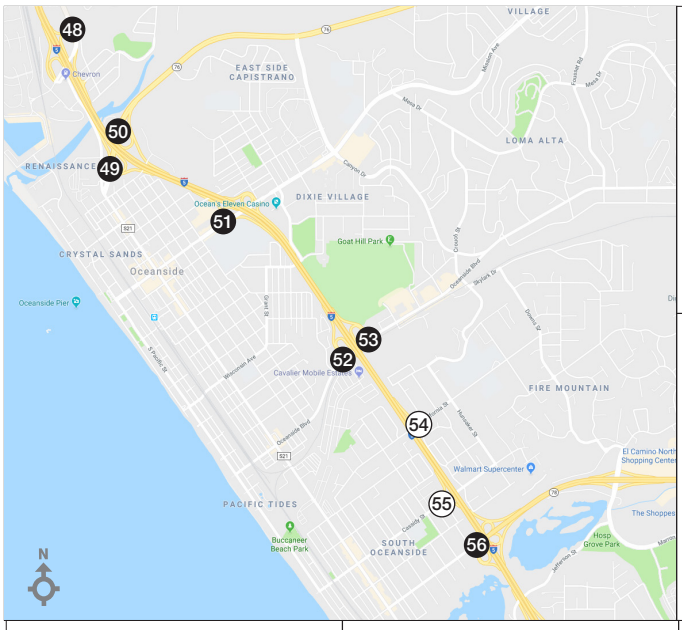
Figure 3-2c Project Roadway Configurations + Control



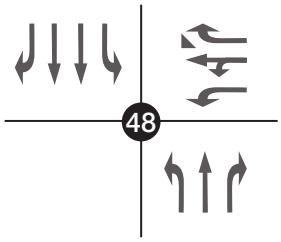
Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | Free Right Turn Lane | Stop Sign Control

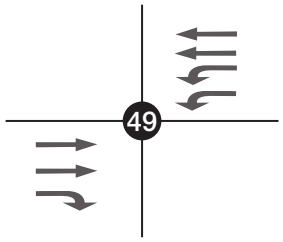
Figure 3-2d Project Roadway Configurations + Control



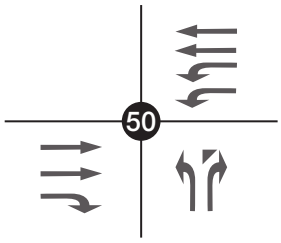
Vandergrift Boulevard and San Rafael Drive/I-5 NB On-Ramp



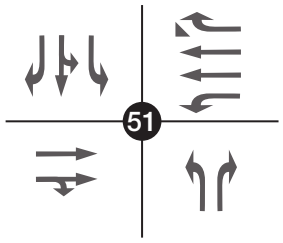
State Route 76 and I-5 SB On-Ramp



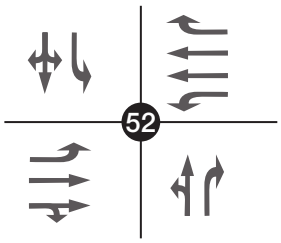
State Route 76 and I-5 NB On/Off-Ramp



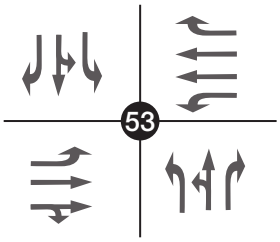
Mission Avenue and Pirates Cove Way/I-5 SB Off-Ramp



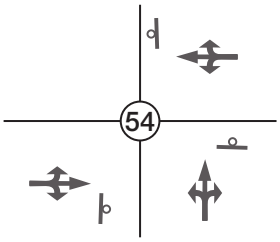
Oceanside Boulevard and I-5 SB On/Off-Ramp



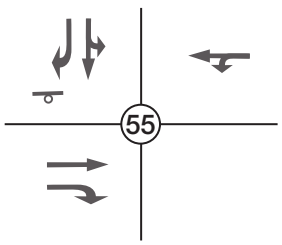
Oceanside Boulevard and I-5 NB On/Off-Ramp



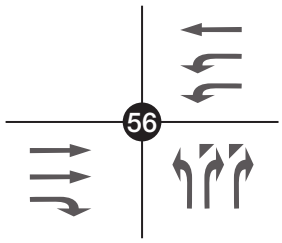
California Street and Soto Street/I-5 NB On-Ramp



Cassidy Street and I-5 SB On-Ramp/I-5 SB Off-Ramp



Vista Way and I-5 SB On/Off-Ramp



Legend

● Signalized Intersections ○ Unsignalized Intersections Free Right Turn Lane Stop Sign Control

Figure 3-3a Project Alternative 1 Roadway Configurations + Control

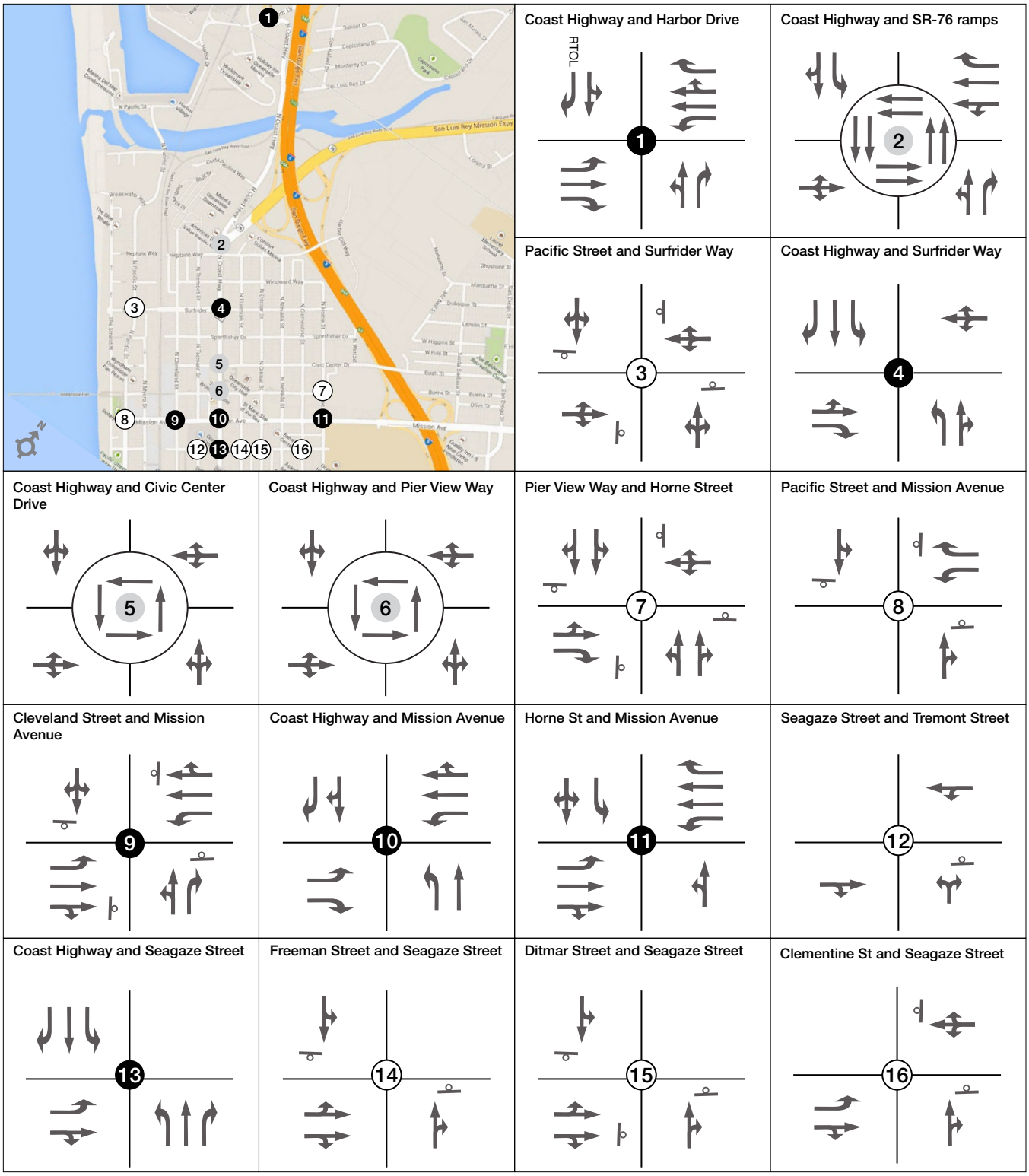


Figure 3-3b Project Alternative 1 Roadway Configurations + Control

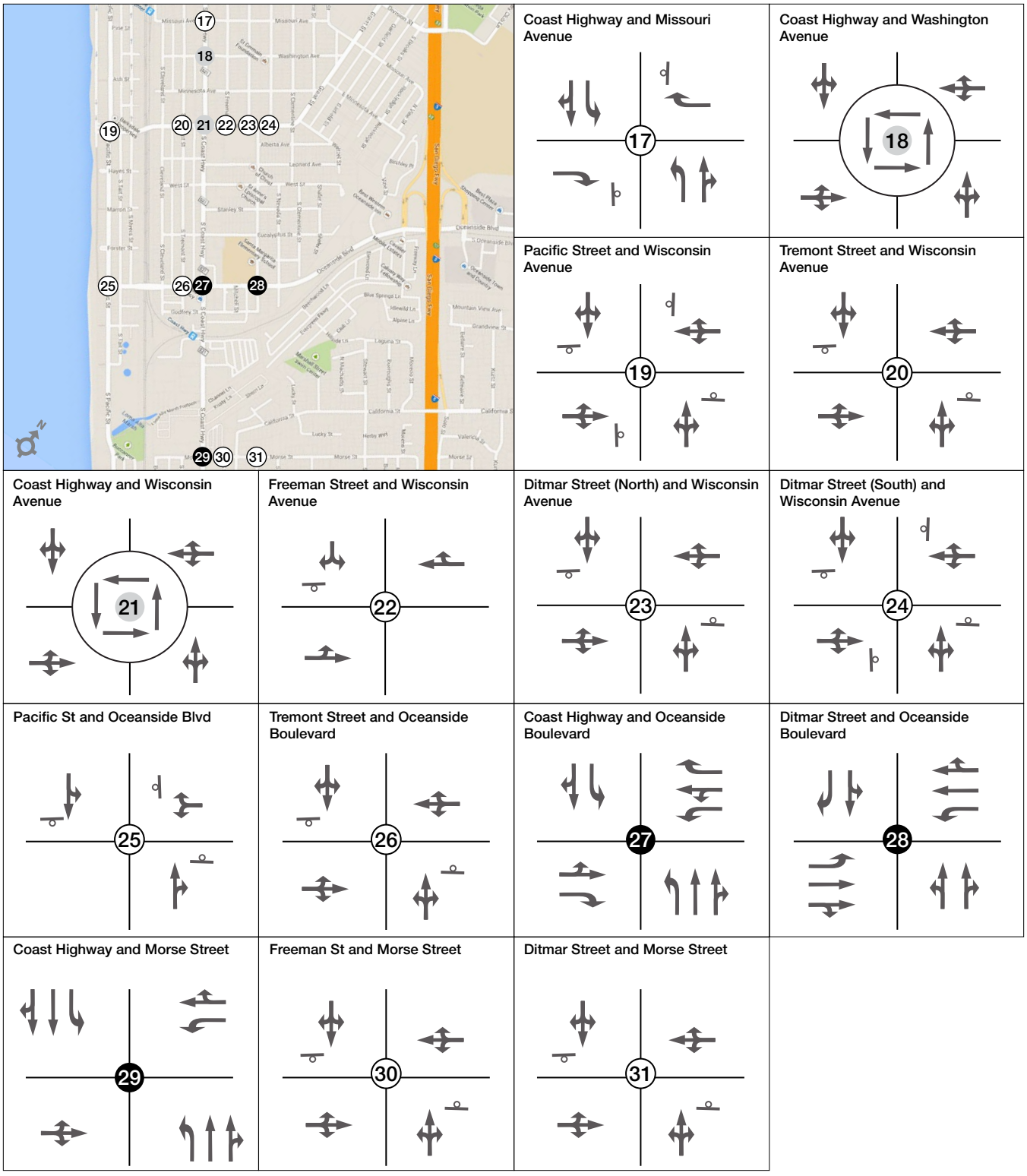
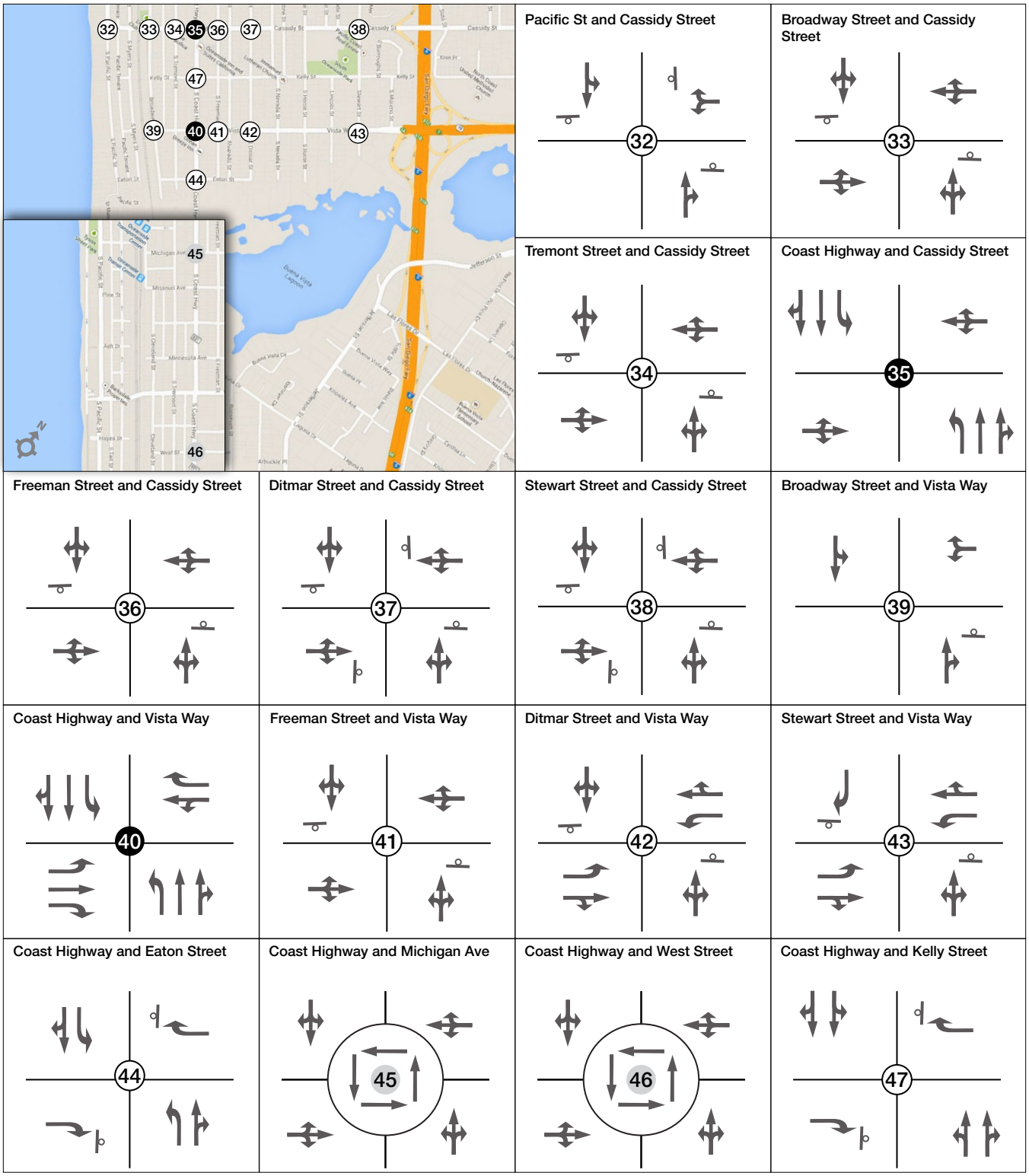


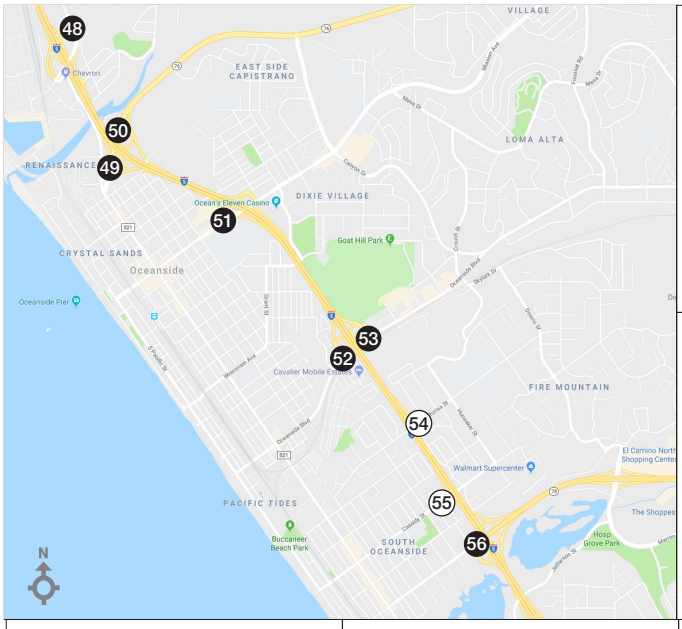
Figure 3-3c Project Alternative 1 Roadway Configurations + Control



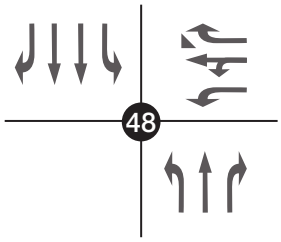
Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | Free Right Turn Lane | Stop Sign Control

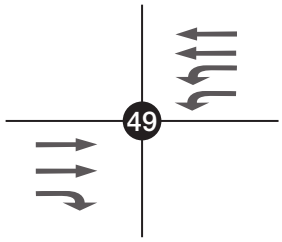
Figure 3-3d Project Option with Pier View Way Closure Roadway Configurations + Control



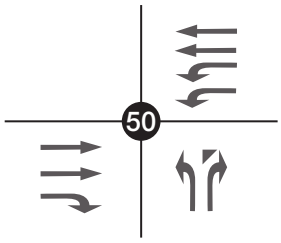
Vandergrift Boulevard and San Rafael Drive/I-5 NB On-Ramp



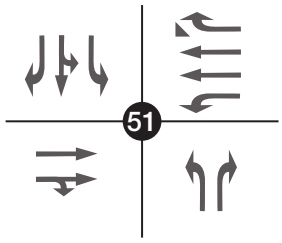
State Route 76 and I-5 SB On-Ramp



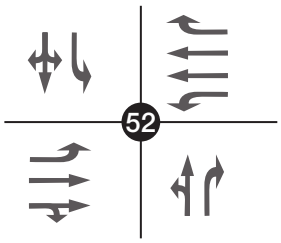
State Route 76 and I-5 NB On/Off-Ramp



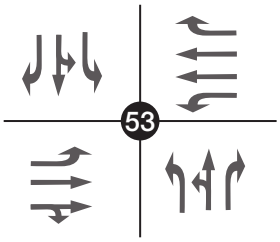
Mission Avenue and Pirates Cove Way/I-5 SB Off-Ramp



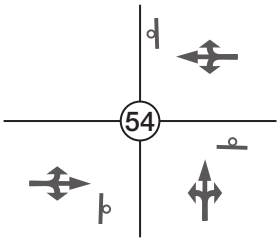
Oceanside Boulevard and I-5 SB On/Off-Ramp



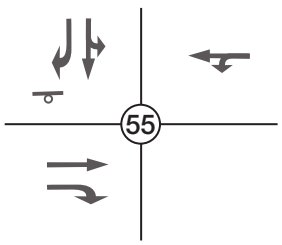
Oceanside Boulevard and I-5 NB On/Off-Ramp



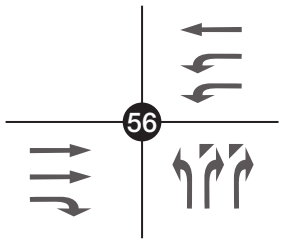
California Street and Soto Street/I-5 NB On-Ramp



Cassidy Street and I-5 SB On-Ramp/I-5 SB Off-Ramp



Vista Way and I-5 SB On/Off-Ramp



Legend

Signalized Intersections | Unsignalized Intersections | Free Right Turn Lane | Stop Sign Control

OCEANSIDE COAST HIGHWAY CORRIDOR STUDY

Figure 3-4a Project Alternative 2 Roadway Configurations + Control

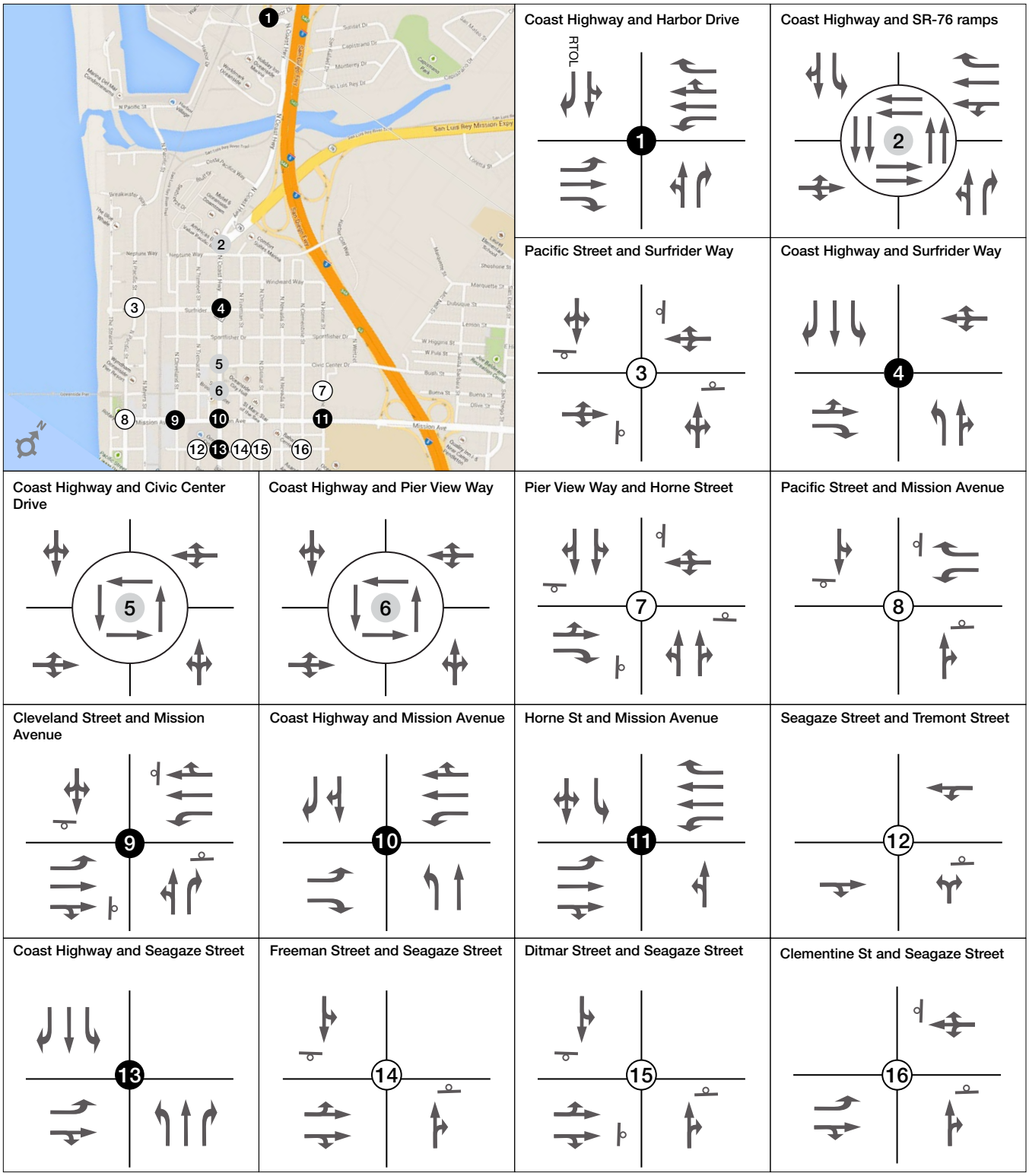


Figure 3-4b Project Alternative 2 Roadway Configurations + Control

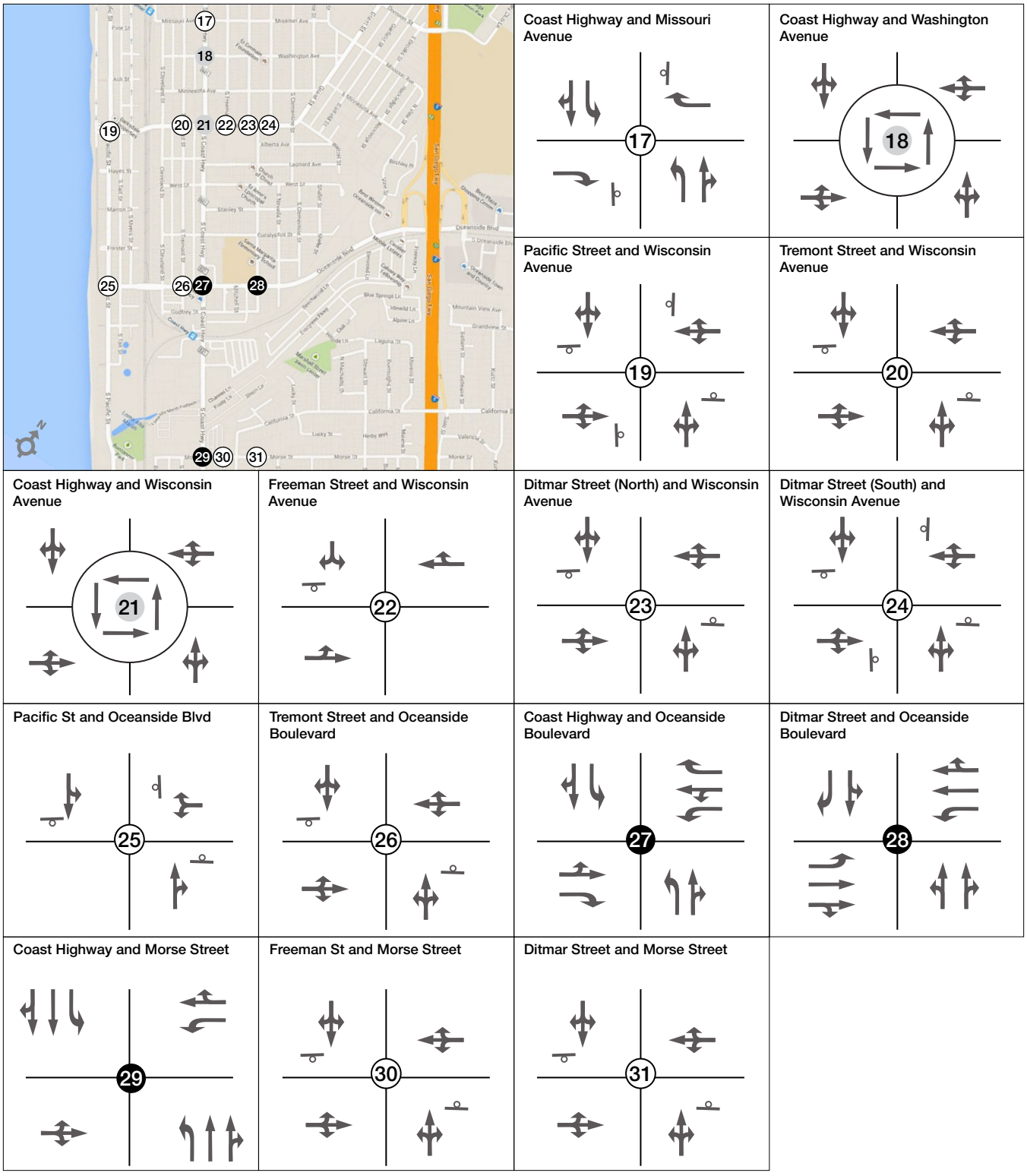
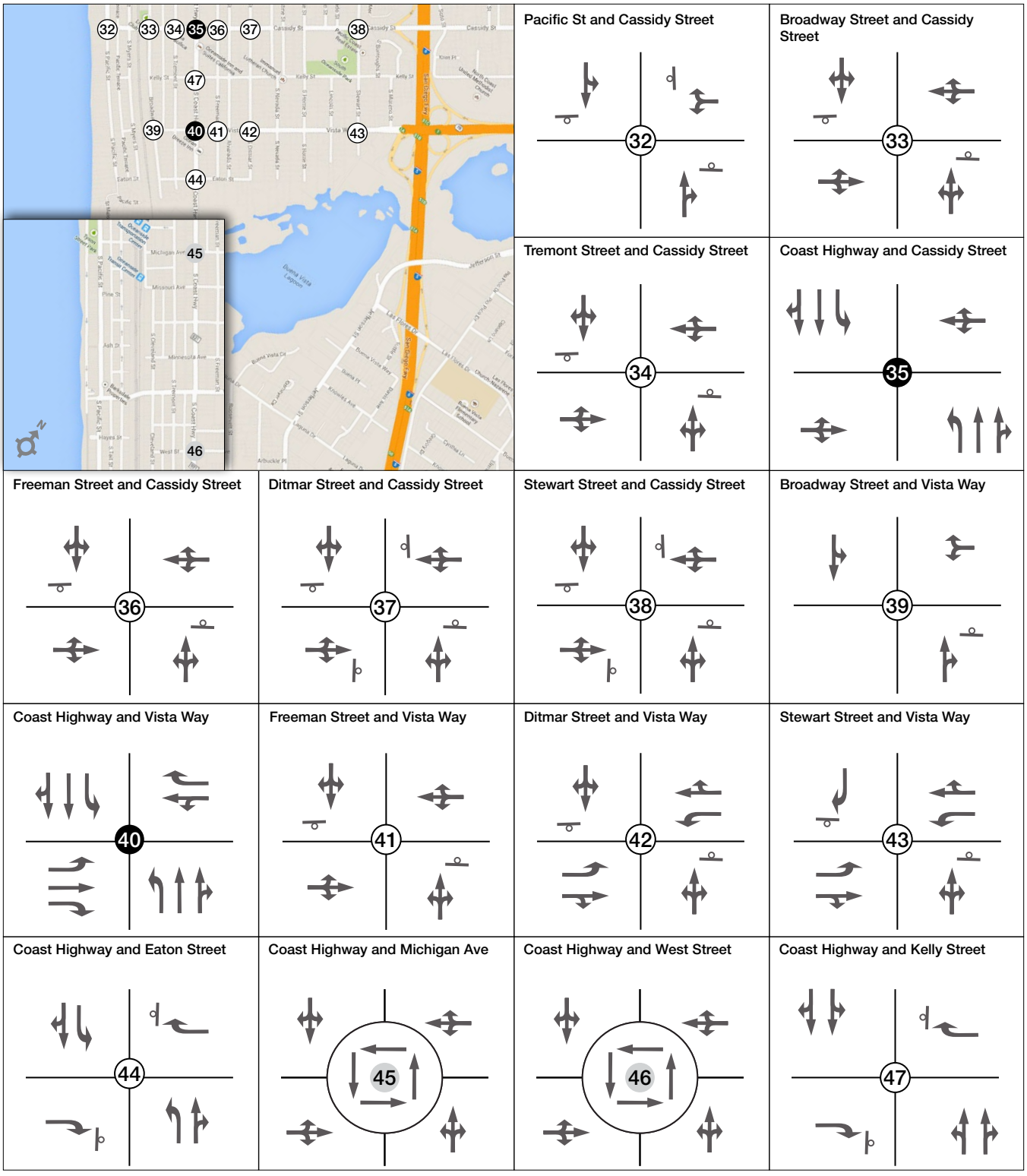


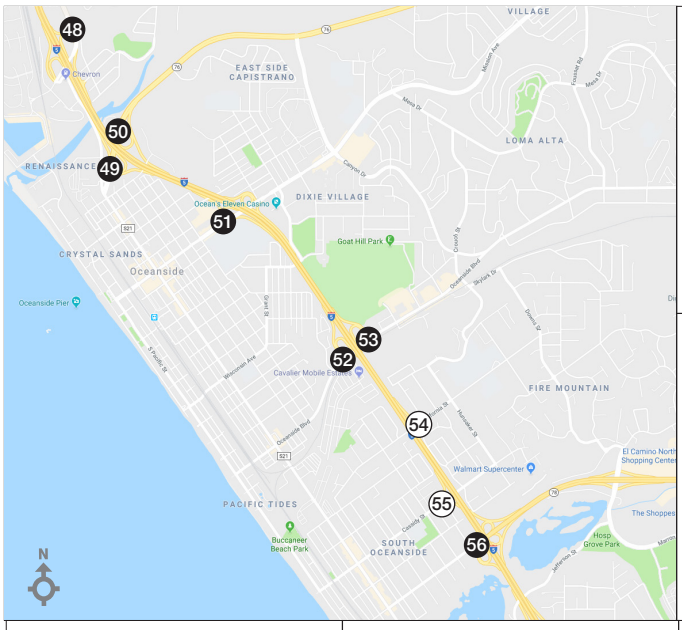
Figure 3-4c Project Alternative 2 Roadway Configurations + Control



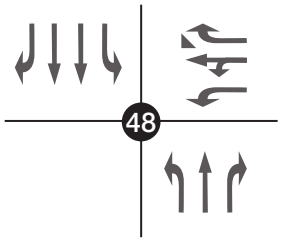
Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | Free Right Turn Lane | Stop Sign Control

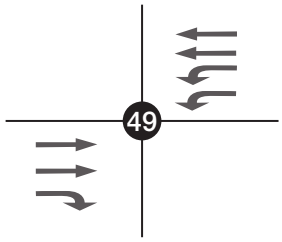
Figure 3-4d Project Alternative 1 Roadway Configurations + Control



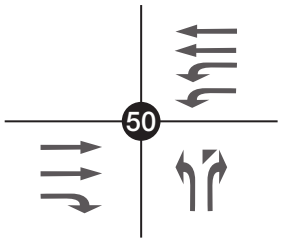
Vandergrift Boulevard and San Rafael Drive/I-5 NB On-Ramp



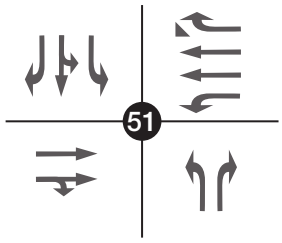
State Route 76 and I-5 SB On-Ramp



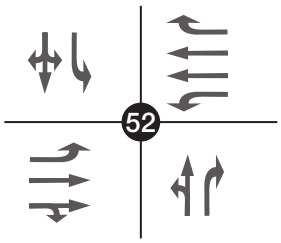
State Route 76 and I-5 NB On/Off-Ramp



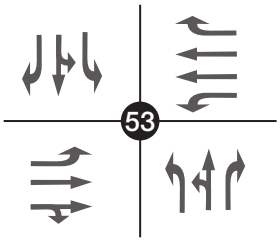
Mission Avenue and Pirates Cove Way/I-5 SB Off-Ramp



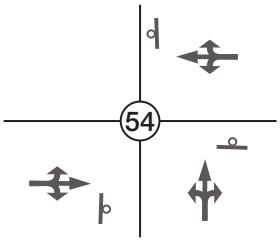
Oceanside Boulevard and I-5 SB On/Off-Ramp



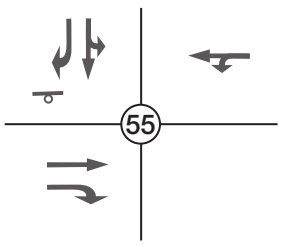
Oceanside Boulevard and I-5 NB On/Off-Ramp



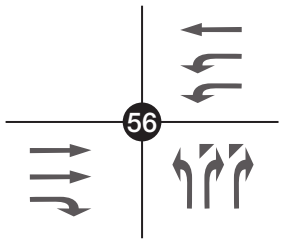
California Street and Soto Street/I-5 NB On-Ramp



Cassidy Street and I-5 SB On-Ramp/I-5 SB Off-Ramp



Vista Way and I-5 SB On/Off-Ramp



Legend

Signalized Intersections | Unsignalized Intersections | Free Right Turn Lane | Stop Sign Control

Figure 3-5a Project Alternative 3 Roadway Configurations + Control

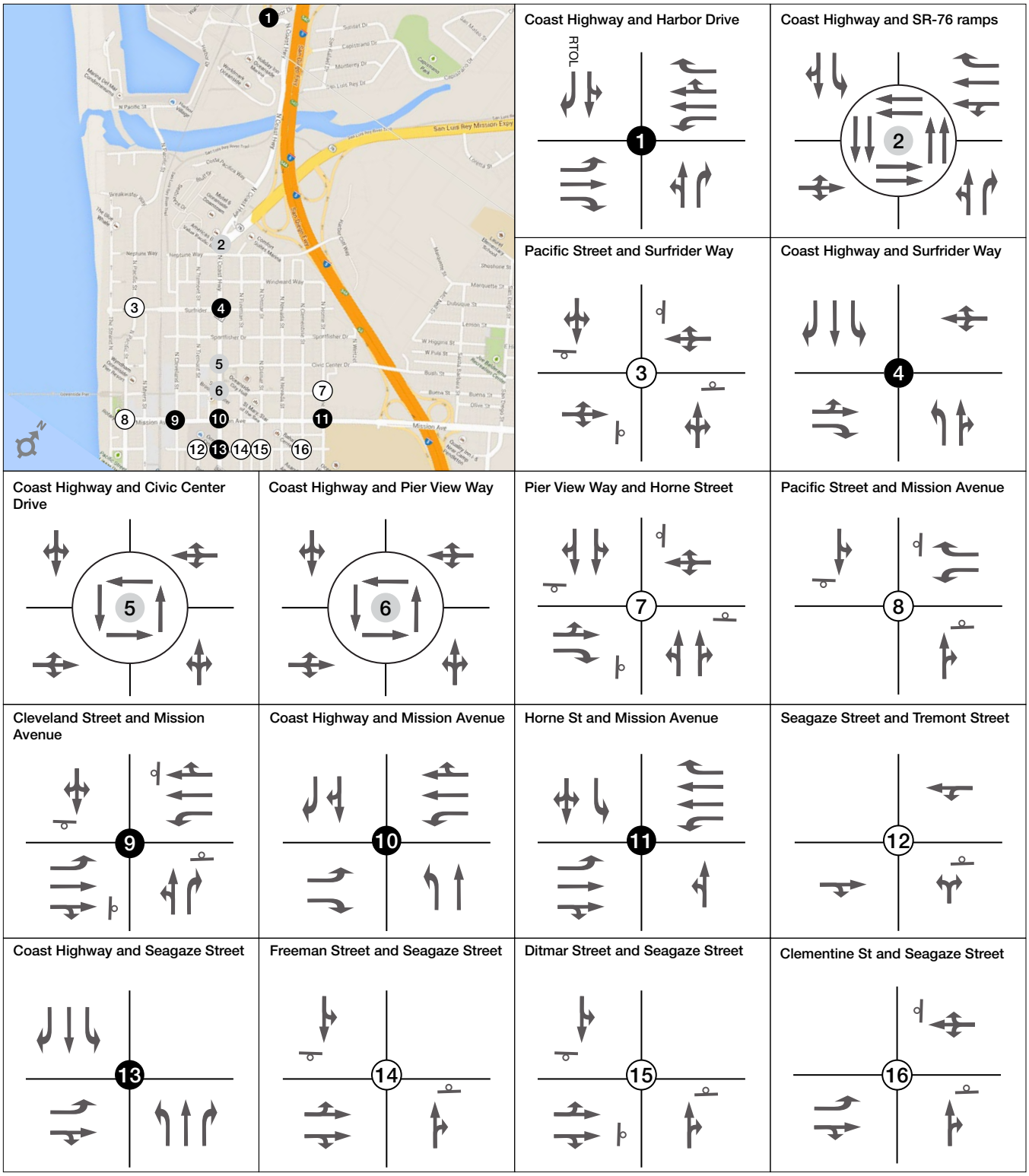


Figure 3-5b Project Alternative 3 Roadway Configurations + Control

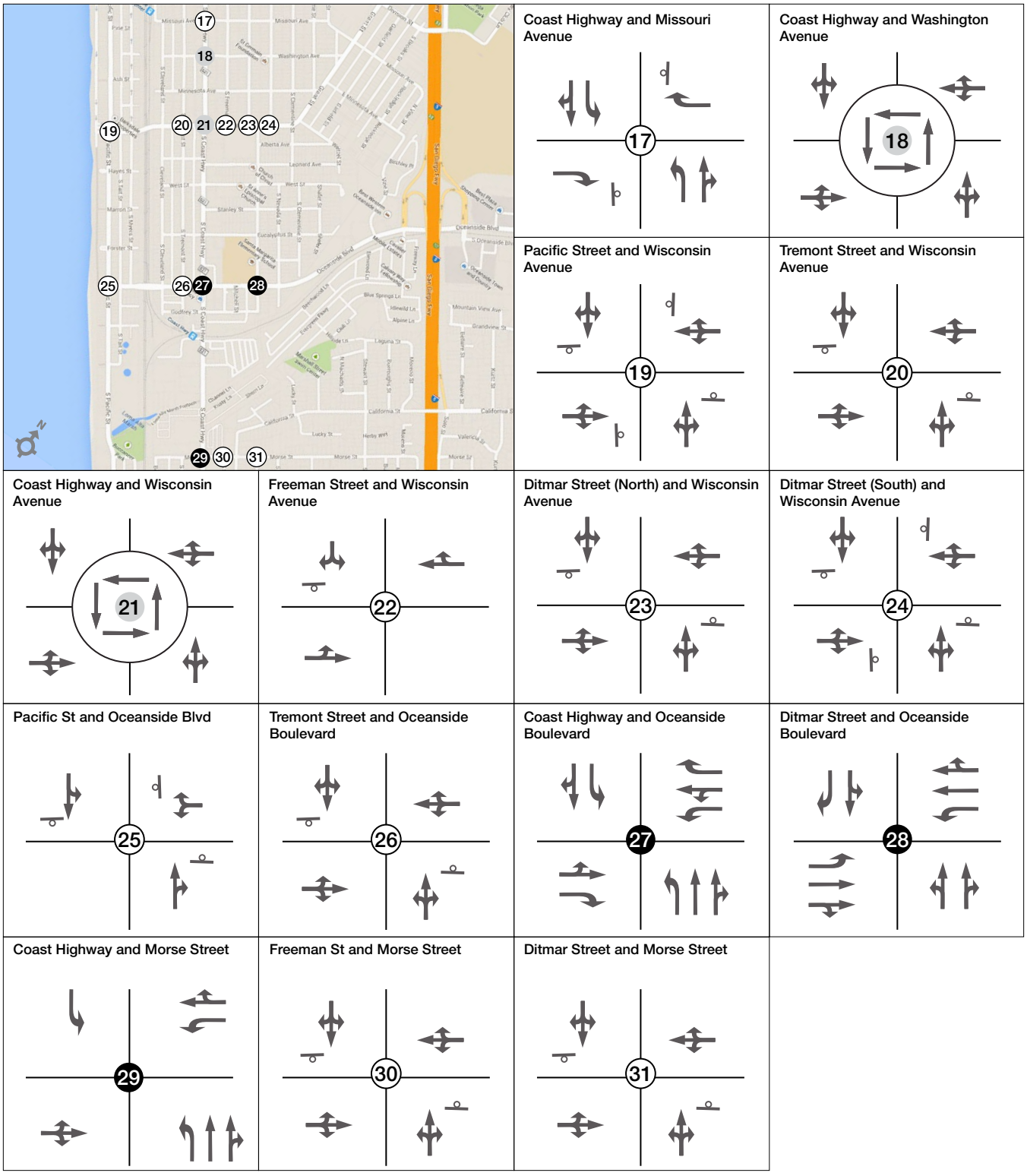
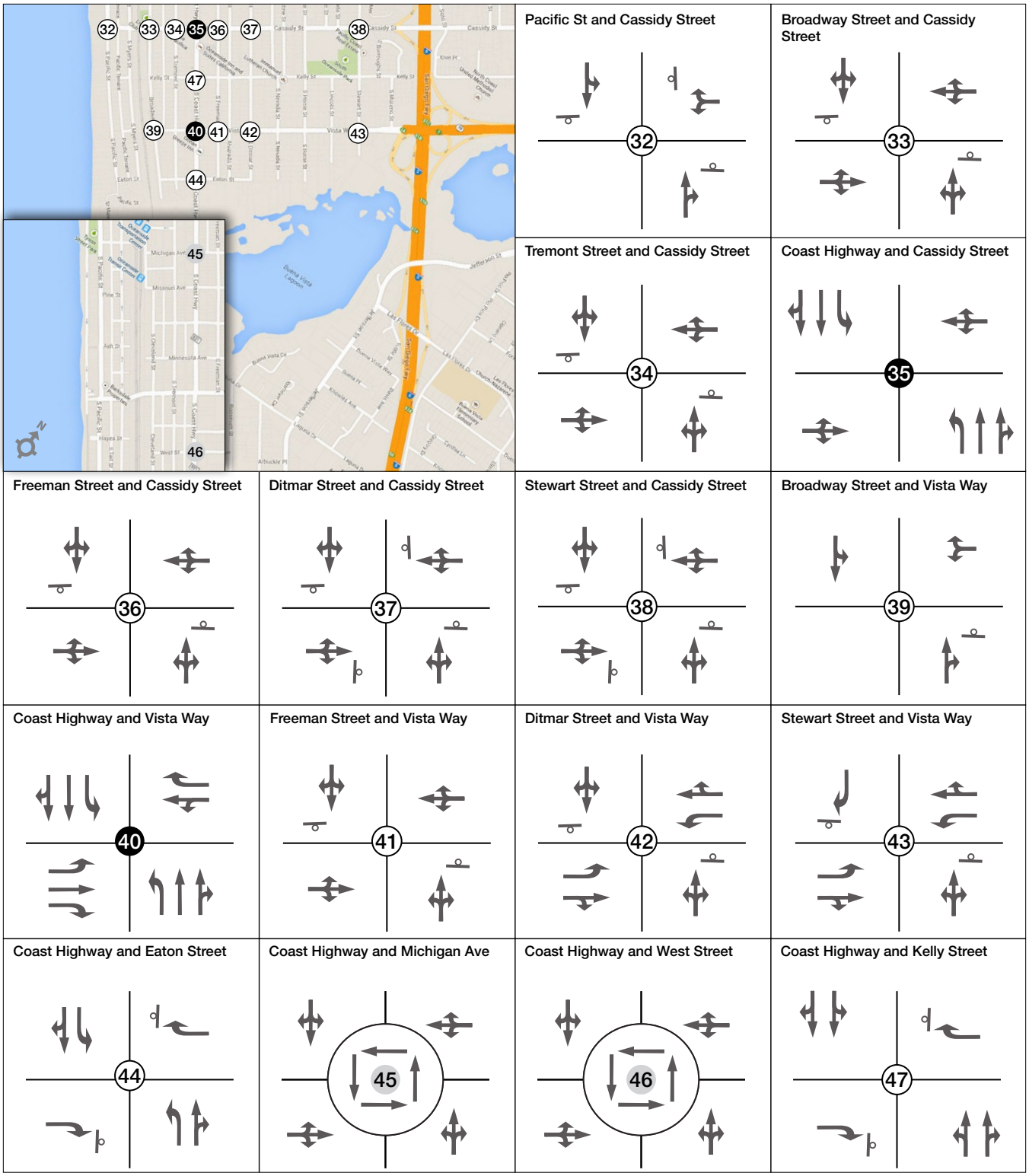


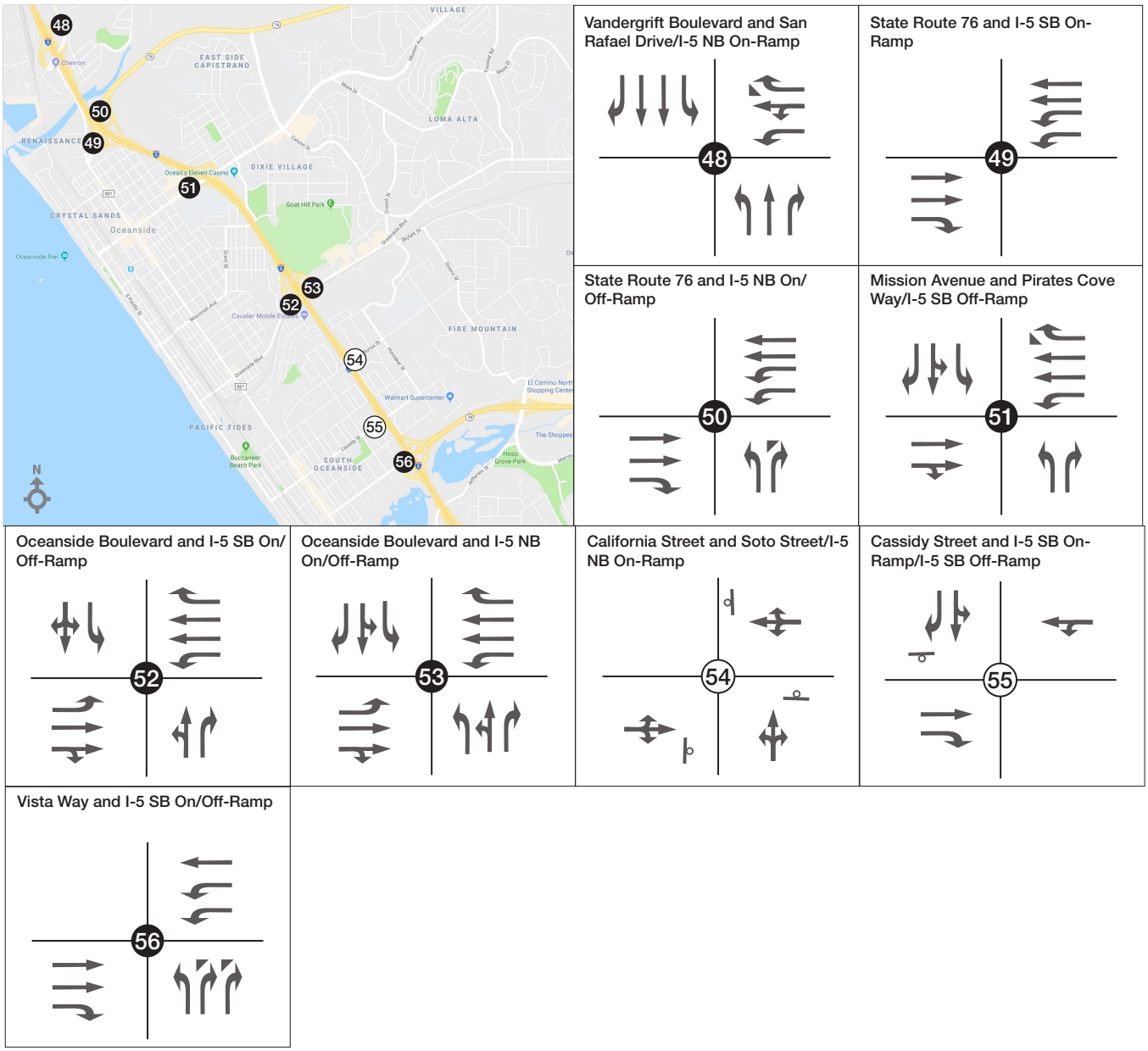
Figure 3-5c Project Alternative 3 Roadway Configurations + Control



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | Free Right Turn Lane | Stop Sign Control

Figure 3-5d Project Alternative 2 Roadway Configurations + Control



Legend

● Signalized Intersections ○ Unsignalized Intersections Free Right Turn Lane Stop Sign Control

OCEANSIDE
COAST HIGHWAY
CORRIDOR STUDY

4 Existing 2013 Conditions

This section provides a review of the existing roadway system in the study area, the traffic volumes for the study intersections and key road segments, and presents the level of service analyses for the existing (2013) conditions scenario.

As discussed in Section 2, the proposed project would transform Coast Highway into a complete street that accommodates all modes of travel in a safe and efficient manner. The key elements of the proposed project include a continuous Class II striped bicycle lane from Harbor Drive to the South City Limit, additional mid-block crosswalks, roundabouts in place of traffic signals, and other enhancements to landscaping and/or the roadway.

Existing peak hour intersection count data and 48-hour roadway segment volumes were collected at the selected intersections and roadway segments in the study area during the summer (August) of 2013. The 2013 traffic counts are not anticipated to be considerably different compared to 2016 conditions as traffic is typically the highest during the summer months and thus captures a conservative representation of 2013 traffic conditions. It is important to note the existing condition scenarios do not include the modified vision plan land uses; existing condition scenarios are based on actual volume counts. This approach was used as the project is not proposing new development, rather, it is in support of the vision plan goals. Future traffic conditions utilize the San Diego Association of Government (SANDAG) forecast model and are derived independently from existing traffic volumes. The detailed traffic count data can be found in Appendix C.

This section covers the following scenarios:

- Existing Baseline (No Project) Conditions – Year 2013 analysis without project including:
    - Four-lane roadway throughout Coast Highway corridor
    - General Plan land uses
- Existing Conditions with Project – Year 2013 analysis with project including:
    - Two-lane roadway throughout Coast Highway corridor with roundabouts
    - Modified Vision Plan land uses
- Existing Conditions with Project Alternative 1 – Year 2013 analysis with project including:
    - Two-lane roadway with roundabouts from Harbor Blvd to Oceanside Blvd and four-lane roadway south of Oceanside Blvd
    - Modified Vision Plan land uses
- Existing Conditions with Project Alternative 2 – Year 2013 analysis with project including:
    - Two-lane roadway with roundabouts from Harbor Blvd to Morse St and four-lane roadway south of Morse St
    - Modified Vision Plan land uses
- Existing Conditions with Project Alternative 3 – Year 2013 analysis with project including:
    - Two-lane roadway with roundabouts from Harbor Blvd to Morse Street and four-lane roadway south of Morse Street
    - Modified Vision Plan land uses north of Morse Street
    - General Plan land uses south of Morse St

4.1 Existing Baseline (No Project)

4.1.1 Road Segment Volumes

Road segment volumes have been included in Appendix A for use in noise modeling purposes. Existing road segment volumes are extracted from 24-hour counts. The 24-hour count sheets are contained in Appendix C. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

4.1.2 Intersection Level of Service

The intersection operations analysis for the existing condition without project was performed consistent with the methodology outlined in Section 3. Of the 56 intersections analyzed in the study area, all intersections, but one are operating at a LOS of D or better. Table 4-1 presents the results for the existing conditions traffic analysis without the proposed project. Figure 4-1 contains the traffic volumes used for the existing condition analysis. Appendix C contains the original count data.

Table 4-1: LOS Analysis – Existing Conditions without Project

INTERSECTION		TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
			Delay (s)	LOS	Delay (s)	LOS
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	28.0	C	51.3	D
2	Coast Highway - SR-76 Ramps	Signalized	13.7	B	37.1	D
3	Surfrider Way - Pacific Street	AWSC	8.5	A	11.2	B
4	Coast Highway - Surfrider Way	Signalized	10.4	B	14.4	B
5	Coast Highway - Civic Center Drive	Signalized	13.7	B	15.1	B
6	Coast Highway - Pier View Way	Signalized	16.8	B	16.6	B
7	Pier View Way - Horne Street	AWSC	8.7	A	11.9	B
8	Mission Avenue - Pacific Street	AWSC	7.9	A	10.1	B
9	Mission Avenue - Cleveland Street	AWSC	8.1	A	10.6	B
10	Coast Highway - Mission Avenue	Signalized	13.1	B	13.8	B
11	Mission Avenue - Horne Street	Signalized	7.4	A	18.9	B
12	Seagaze Street - Tremont Street	SSSC	3.3	A	11.5	B
13	Coast Highway - Seagaze Street	Signalized	14.7	B	23.9	C
14	Seagaze Street - Freeman Street	SSSC	10.3	A	15.6	C
15	Seagaze Street - Ditmar Street	AWSC	7.9	A	12.5	B
16	Seagaze Street - Clementine Street	SSSC	7.9	A	13.1	B
17	Coast Highway - Missouri Avenue	SSSC	12.0	B	23.9	C
18	Coast Highway - Washington Avenue	SSSC	11.3	B	22.0	C
19	Wisconsin Avenue - Pacific Street	AWSC	8.1	A	9.8	A
20	Wisconsin Avenue - Tremont Street	SSSC	10.6	B	14.0	B
21	Coast Highway - Wisconsin Avenue	Signalized	8.9	A	12.2	B
22	Wisconsin Avenue - Freeman Street	SSSC	9.1	A	9.7	A
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	9.7	A	10.1	B
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	7.5	A	7.9	A
25	Oceanside Boulevard - Pacific Street	AWSC	8.0	A	9.0	A
26	Oceanside Boulevard - Tremont Street	SSSC	10.9	B	14.7	B
27	Coast Highway - Oceanside Boulevard	Signalized	29.7	C	39.7	D

INTERSECTION		TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
			Delay (s)	LOS	Delay (s)	LOS
28	Oceanside Boulevard - Ditmar Street	Signalized	5.7	A	6.8	A
29	Coast Highway - Morse Street	Signalized	9.0	A	9.8	A
30	Morse Street - Freeman Street	SSSC	9.0	A	10.0	B
31	Morse Street - Ditmar Street	SSSC	8.8	A	9.2	A
32	Cassidy Street - Pacific Street	AWSC	7.7	A	9.3	A
33	Cassidy Street - Broadway Street	SSSC	10.3	B	14.5	B
34	Cassidy Street - Tremont Street	SSSC	9.9	A	12.4	B
35	Coast Highway - Cassidy Street	Signalized	9.1	A	14.0	B
36	Cassidy Street - Freeman Street	SSSC	10.2	B	12.7	B
37	Cassidy Street - Ditmar Street	AWSC	8.1	A	9.5	A
38	Cassidy Street - Stewart Street	AWSC	9.3	A	13.2	B
39	Vista Way - Broadway Street	SSSC	7.4	A	7.6	A
40	Coast Highway - Vista Way	Signalized	22.7	C	37.0	D
41	Vista Way - Freeman Street	SSSC	12.2	B	15.3	C
42	Vista Way - Ditmar Street	SSSC	13.0	B	18.7	C
43	Vista Way - Stewart Street	SSSC	12.3	B	17.4	C
44	Coast Highway - Eaton Street	SSSC	12.8	B	14.3	B
45	Coast Highway - Michigan Avenue	Signalized	7.3	A	9.0	A
46[7]	Coast Highway - West Street	SSSC	--	--	--	--
47[8]	Coast Highway - Kelly Street	SSSC	--	--	--	--
48	Harbor/Vandegrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	17.6	B	22.7	C
49	SR-76 - I-5 SB On-Ramp	Signalized	8.9	A	7.0	A
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	22.4	C	25.9	C
51	Mission - I-5 SB Off-Ramp	Signalized	14.7	B	20.7	C
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	39.3	D	65.3	E
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	38.3	D	52.4	D
54	California - I-5 NB On-Ramp	AWSC	9.2	A	8.5	A
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	8.9	A	8.7	A
56	Vista Way - I-5 SB On/Off-Ramp	Signalized	11.0	B	**11.2**	**B**

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. OWSC – One-way stop control intersection
F. The minimum acceptable LOS is "D" for intersections 1-47
G. The minimum acceptable LOS is "D"; a change from C or D to a lower LOS will cause an impact for intersections 48-56
H. Existing turning movement volumes not available for Int 46 and Int 47

[7] Not part of the original 2013 counts. In order to provide a more consistent and complete analysis, intersections 46 was added to the study in 2016. Therefore, existing turning movement counts are not available for the study intersection.
[8] Not part of the original 2013 counts. In order to provide a more consistent and complete analysis, intersections 47 was added to the study in 2016. Therefore, existing turning movement counts are not available for the study intersection.

Figure 4-1a Existing (No Project) Peak Hour Volumes - AM & PM

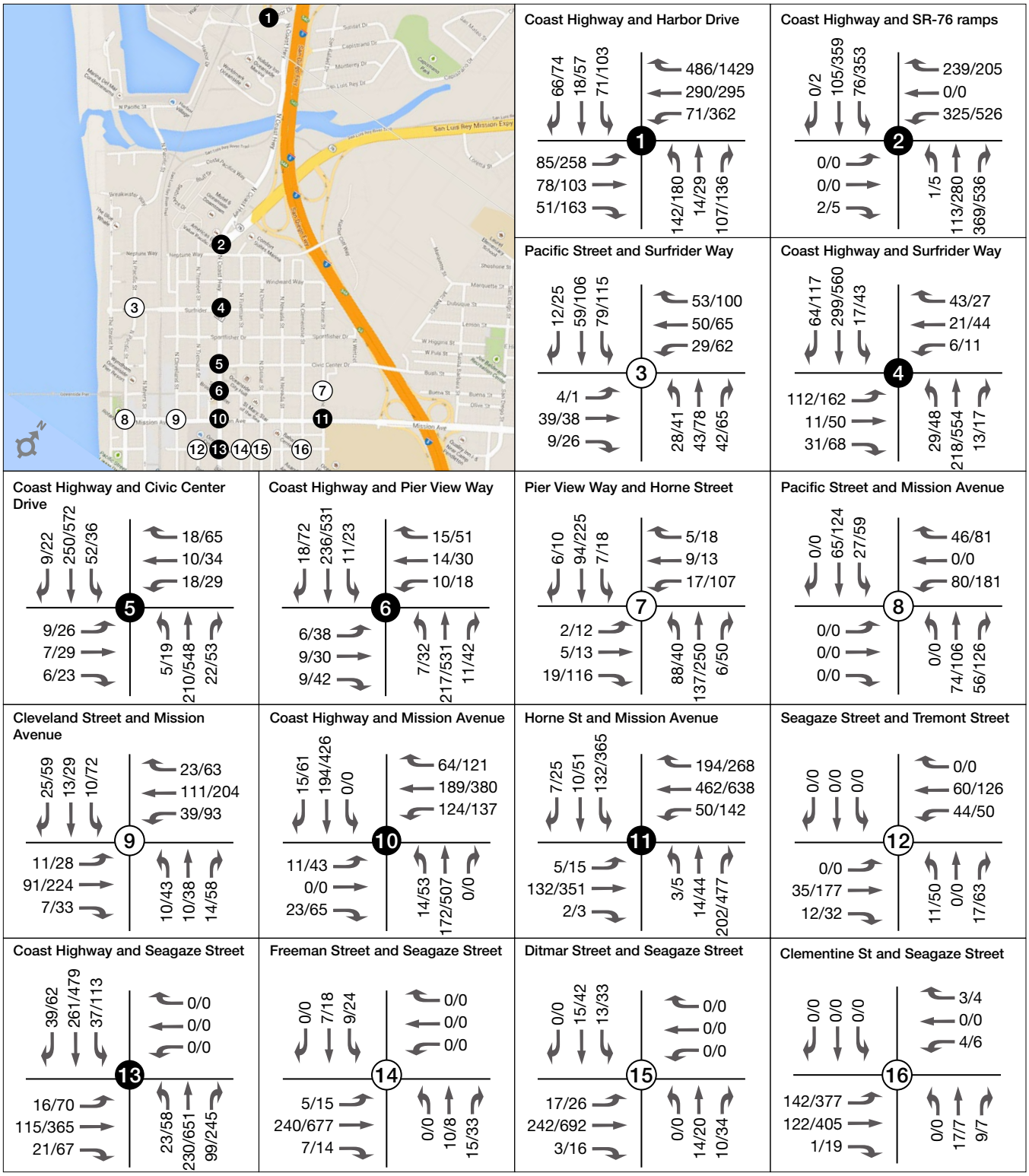
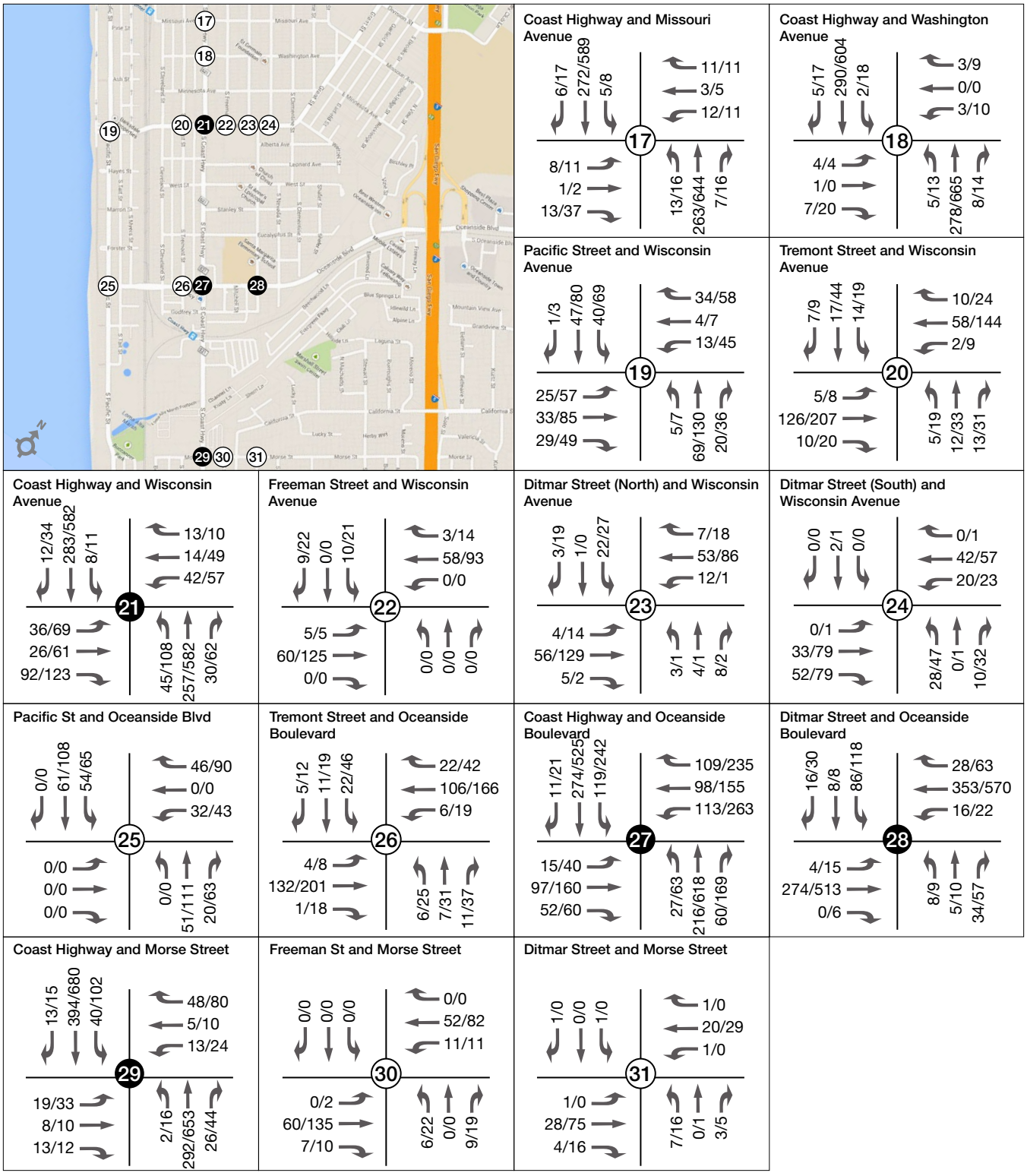


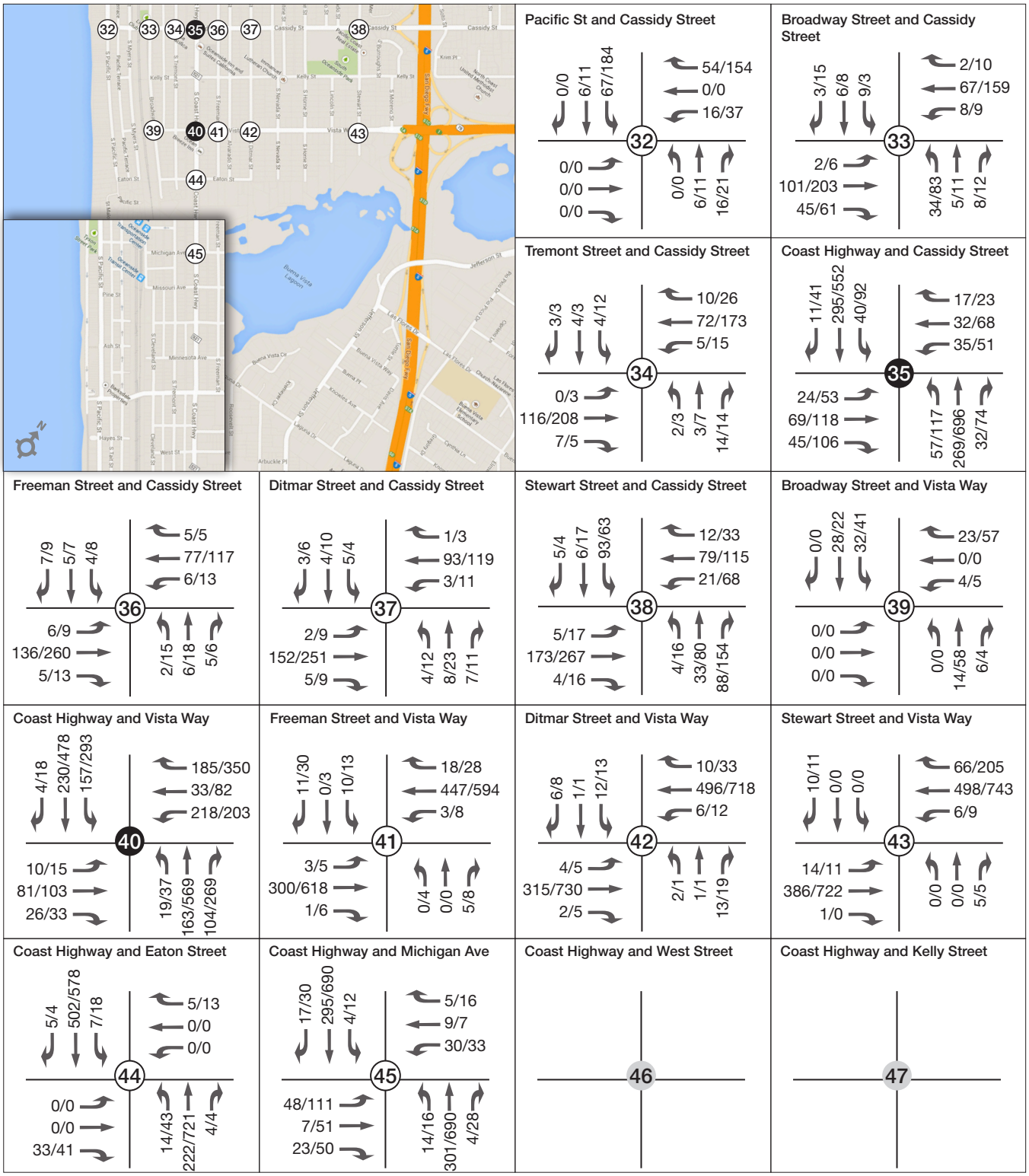
Figure 4-1b Existing (No Project) Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ##/## AM/PM Turning Movement Volume

Figure 4-1c Existing (No Project) Peak Hour Volumes - AM & PM



Note: Existing turning movement volumes not available for Intersections 46 and 47

OCEANSIDE
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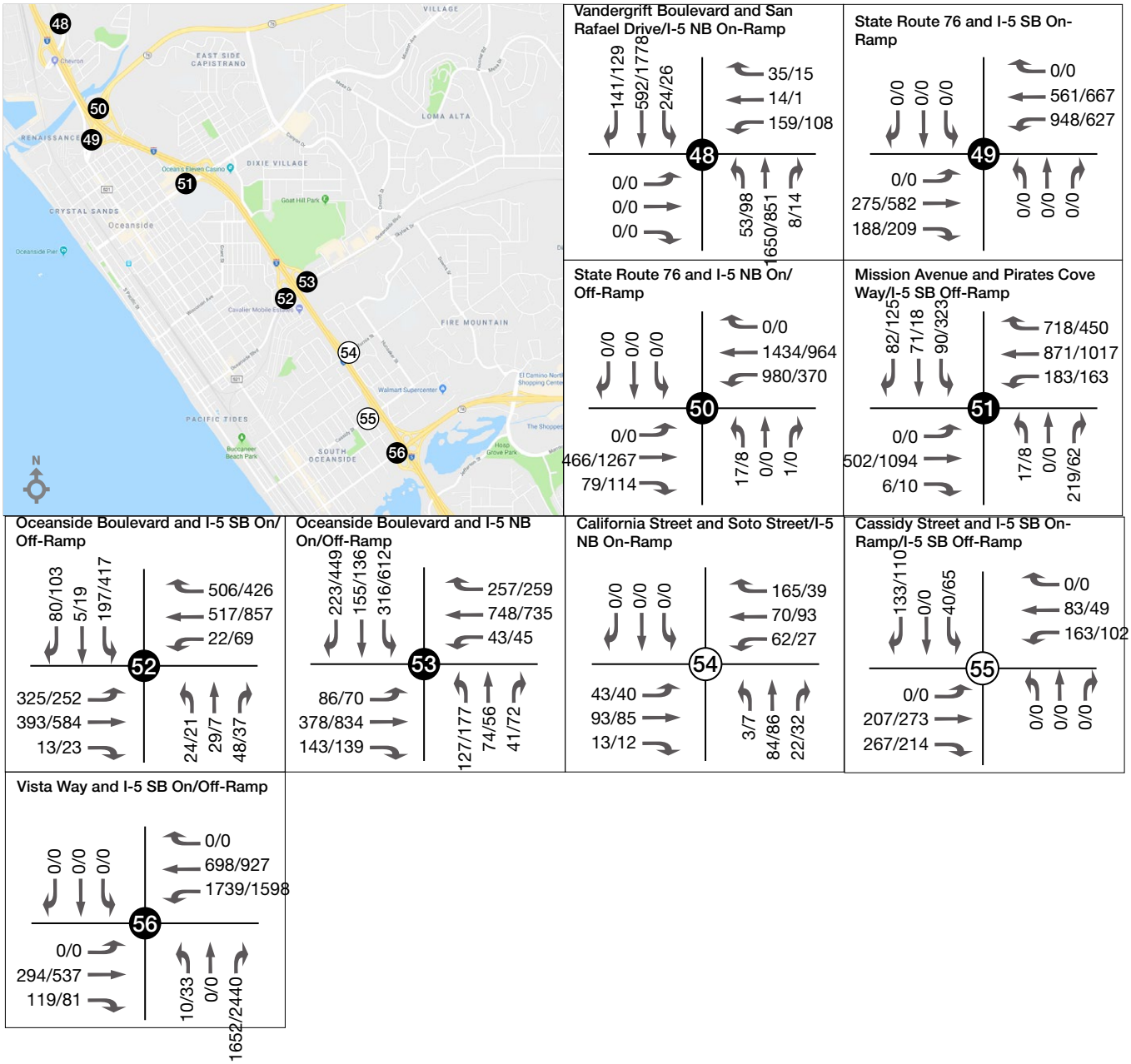
Figure 4-1d Existing (No Project) Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ##/## AM/PM Turning Movement Volume

4.2 Existing Conditions with Project (Two-Lane Coast Highway)

This section examines traffic conditions with the Coast Highway Corridor Project which proposes 2 lanes throughout the corridor with 12 new roundabouts as described in section 3.6.2. The analysis was conducted for the existing conditions.

4.2.1 Road Segment Volumes

Road segment volumes have been included in Appendix A for use in noise modeling purposes. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

4.2.2 Intersection Level of Service

The intersection operations analysis for the existing condition with project was performed consistent with the methodology outlined in Section 3. Table 4-2 presents the results for the existing conditions traffic analysis with project. A comparison between the existing condition without and with project is also provided. Figure 4-2 contains the traffic volumes used for the existing conditions with project analysis.

Table 4-2: LOS Analysis – Existing Conditions with Project

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	28.0	C	Signalized	AM	31.1	C	No
			PM	51.3	D		PM	51.3	D	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	13.7	B	RBT	AM	3.1	A	No
			PM	37.1	D		PM	8.6	A	No
3	Surfrider Way - Pacific Street	AWSC	AM	8.5	A	AWSC	AM	8.5	A	No
			PM	11.2	B		PM	10.5	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	10.4	B	RBT	AM	6.6	A	No
			PM	14.4	B		PM	17.0	C	No
5	Coast Highway - Civic Center Drive	Signalized	AM	13.7	B	RBT	AM	6.1	A	No
			PM	15.1	B		PM	13.3	B	No
6	Coast Highway - Pier View Way	Signalized	AM	16.8	B	RBT	AM	5.6	A	No
			PM	16.6	B		PM	12.9	B	No
7	Pier View Way - Horne Street	AWSC	AM	8.7	A	AWSC	AM	8.7	A	No
			PM	11.9	B		PM	11.9	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	7.9	A	AWSC	AM	7.9	A	No
			PM	10.1	B		PM	10.0	A	No
9	Mission Avenue - Cleveland Street	AWSC	AM	8.1	A	AWSC	AM	8.1	A	No
			PM	10.6	B		PM	10.6	B	No
10	Coast Highway - Mission Avenue	Signalized	AM	13.1	B	Signalized	AM	8.0	A	No
			PM	13.8	B		PM	12.2	B	No
11	Mission Avenue - Horne Street	Signalized	AM	7.4	A	Signalized	AM	6.7	A	No
			PM	18.9	B		PM	17.1	B	No
12	Seagaze Street - Tremont Street	SSSC	AM	3.3	A	SSSC	AM	9.1	A	No
			PM	11.5	B		PM	11.5	B	No

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
13	Coast Highway - Seagaze Street	Signalized	AM	14.7	B	Signalized	AM	16.1	B	No
			PM	23.9	C		PM	27.3	C	No
14	Seagaze Street - Freeman Street	SSSC	AM	10.3	A	SSSC	AM	10.3	B	No
			PM	15.6	C		PM	15.6	C	No
15	Seagaze Street - Ditmar Street	AWSC	AM	7.9	A	AWSC	AM	7.6	A	No
			PM	12.5	B		PM	12.0	B	No
16	Seagaze Street - Clementine Street	SSSC	AM	7.9	A	SSSC	AM	7.9	A	No
			PM	13.1	B		PM	8.3	A	No
17	Coast Highway - Missouri Avenue	SSSC	AM	12.0	B	SSSC	AM	10.0	A	No
			PM	23.9	C		PM	13.5	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	11.3	B	RBT	AM	6.4	A	No
			PM	22.0	C		PM	13.2	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	8.1	A	AWSC	AM	7.8	A	No
			PM	9.8	A		PM	9.5	A	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	10.6	B	SSSC	AM	10.6	B	No
			PM	14.0	B		PM	14.0	B	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	8.9	A	RBT	AM	7.0	A	No
			PM	12.2	B		PM	22.0	C	No
22	Wisconsin Avenue - Freeman Street	SSSC	AM	9.1	A	SSSC	AM	9.1	A	No
			PM	9.7	A		PM	9.7	A	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	9.7	A	SSSC	AM	9.7	A	No
			PM	10.1	B		PM	10.1	B	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	7.5	A	AWSC	AM	7.3	A	No
			PM	7.9	A		PM	7.9	A	No
25	Oceanside Boulevard - Pacific Street	AWSC	AM	8.0	A	AWSC	AM	7.7	A	No
			PM	9.0	A		PM	8.7	A	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	10.9	B	SSSC	AM	10.9	B	No
			PM	14.7	B		PM	14.6	B	No
27	Coast Highway - Oceanside Boulevard	Signalized	AM	29.7	C	RBT	AM	9.9	A	No
			PM	39.7	D		PM	**52.1**	**F**	**Yes**
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	5.7	A	Signalized	AM	5.4	A	No
			PM	6.8	A		PM	5.9	A	No
29	Coast Highway - Morse Street	Signalized	AM	9.0	A	RBT	AM	7.5	A	No
			PM	9.8	A		PM	20.9	C	No
30	Morse Street - Freeman Street	SSSC	AM	9.0	A	SSSC	AM	9.0	A	No
			PM	10.0	B		PM	10.0	B	No
31	Morse Street - Ditmar Street	SSSC	AM	8.8	A	SSSC	AM	8.8	A	No
			PM	9.2	A		PM	9.2	A	No
32	Cassidy Street - Pacific Street	AWSC	AM	7.7	A	AWSC	AM	7.3	A	No
			PM	9.3	A		PM	8.7	A	No
33	Cassidy Street - Broadway Street	SSSC	AM	10.3	B	SSSC	AM	10.3	B	No
			PM	14.5	B		PM	14.5	B	No
34	Cassidy Street - Tremont Street	SSSC	AM	9.9	A	SSSC	AM	9.9	A	No
			PM	12.4	B		PM	12.4	B	No

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
35	Coast Highway - Cassidy Street	Signalized	AM	9.1	A	RBT	AM	7.8	A	No
			PM	14.0	B		PM	**61.9**	**F**	**Yes**
36	Cassidy Street - Freeman Street	SSSC	AM	10.2	B	SSSC	AM	10.2	B	No
			PM	12.7	B		PM	12.7	B	No
37	Cassidy Street - Ditmar Street	AWSC	AM	8.1	A	AWSC	AM	7.9	A	No
			PM	9.5	A		PM	9.0	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	9.3	A	AWSC	AM	8.9	A	No
			PM	13.2	B		PM	12.0	B	No
39	Vista Way - Broadway Street	SSSC	AM	7.4	A	SSSC	AM	7.4	A	No
			PM	7.6	A		PM	7.6	A	No
40	Coast Highway - Vista Way	Signalized	AM	22.7	C	Signalized	AM	24.2	C	No
			PM	37.0	D		PM	46.4	D	No
41	Vista Way - Freeman Street	SSSC	AM	12.2	B	SSSC	AM	12.2	B	No
			PM	15.3	C		PM	15.3	C	No
42	Vista Way - Ditmar Street	SSSC	AM	13.0	B	SSSC	AM	13.0	B	No
			PM	18.7	C		PM	18.7	C	No
43	Vista Way - Stewart Street	SSSC	AM	12.3	B	SSSC	AM	12.3	B	No
			PM	17.4	C		PM	17.4	C	No
44	Coast Highway - Eaton Street	SSSC	AM	12.8	B	SSSC	AM	12.0	B	No
			PM	14.3	B		PM	16.5	C	No
45	Coast Highway - Michigan Avenue	Signalized	AM	7.3	A	RBT	AM	6.7	A	No
			PM	9.0	A		PM	22.5	C	No
46	Coast Highway - West Street	SSSC	AM	--	--	RBT	AM	--	--	--
			PM	--	--		PM	--	--	--
47	Coast Highway - Kelly Street	SSSC	AM	--	--	RBT	AM	--	--	--
			PM	--	--		PM	--	--	--
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	17.6	B	Signalized	AM	17.6	B	No
			PM	22.7	C		PM	22.7	C	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	8.9	A	Signalized	AM	8.9	A	No
			PM	7.0	A		PM	7.0	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	22.4	C	Signalized	AM	22.4	C	No
			PM	25.9	C		PM	25.9	C	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	14.7	B	Signalized	AM	14.7	B	No
			PM	20.7	C		PM	17.6	B	No
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	AM	39.3	D	Signalized	AM	39.3	D	No
			PM	65.3	E		PM	51.6	D	No
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	38.3	D	Signalized	AM	38.3	D	No
			PM	52.4	D		PM	47.4	D	No
54	California - I-5 NB On-Ramp	AWSC	AM	9.2	A	AWSC	AM	9.2	A	No
			PM	8.7	A		PM	8.5	A	No
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	8.9	A	SSSC	AM	8.9	A	No
			PM	8.7	A		PM	8.7	A	No
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	11.0	B	Signalized	AM	11.0	B	No
			PM	**11.2**	**B**		PM	**11.2**	**B**	No

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. RBT – Roundabout
F. The minimum acceptable LOS is "D" for intersections 1-47
G. The minimum acceptable LOS is "D"; a change from C or D to a lower LOS will cause an impact for intersections 48-56
H. Existing volumes not available for Int 46 and Int 47

It is worth mentioning that delay and LOS does not change for several study intersections since project changes are mainly along Coast Highway. Therefore, intersections outside of Coast Highway will not be affected. The following intersections are identified to generate significant impacts in the PM peak hour in the existing with project conditions:

- Coast Highway and Oceanside Boulevard (#27)
- Coast Highway and Cassidy Street (#35)

All other intersections are not impacted by the proposed project.

Mitigation measures are discussed in Section 7.

Figure 4-2a Existing with Project Peak Hour Volumes - AM & PM

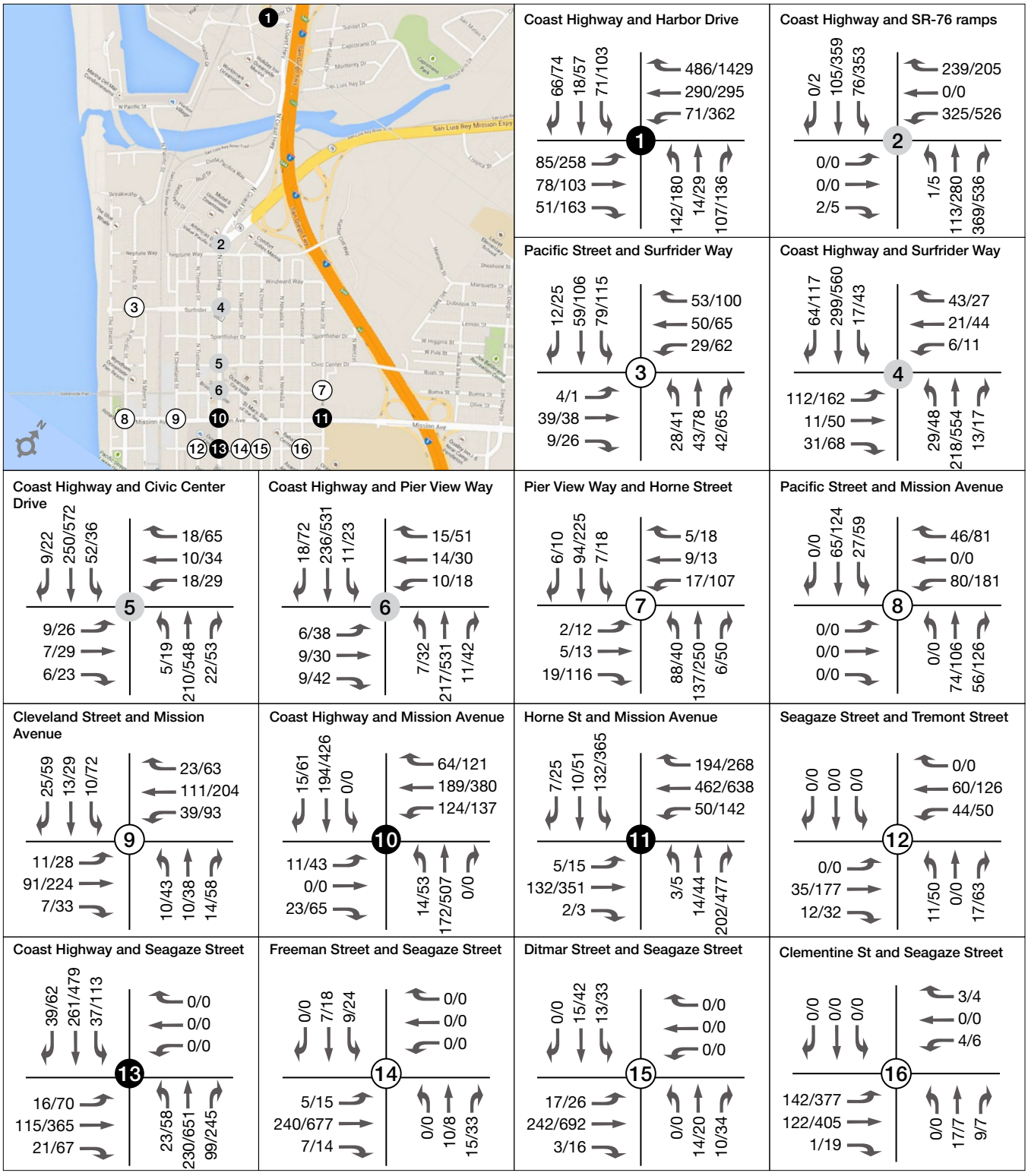


Figure 4-2b Existing with Project Peak Hour Volumes - AM & PM

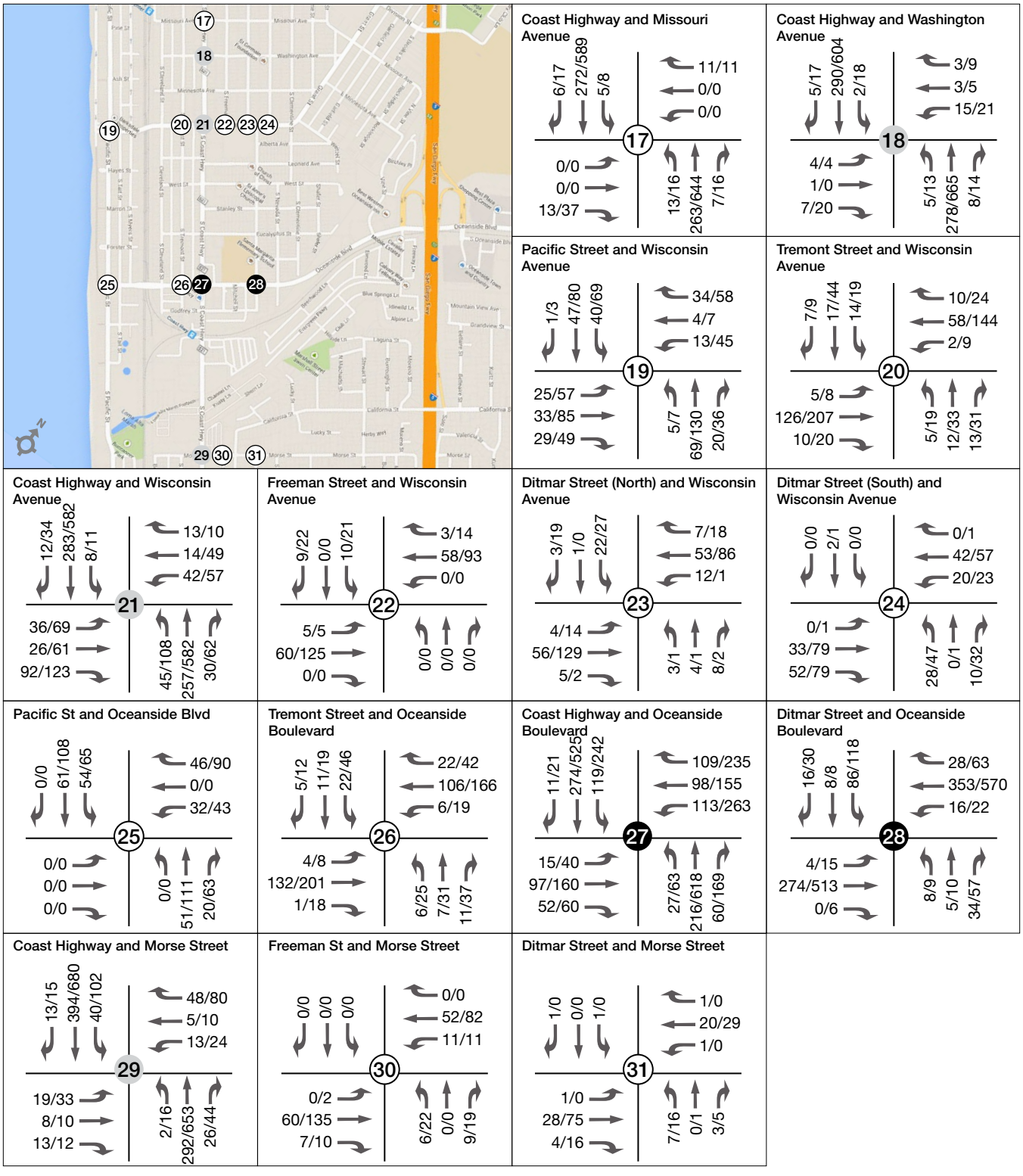
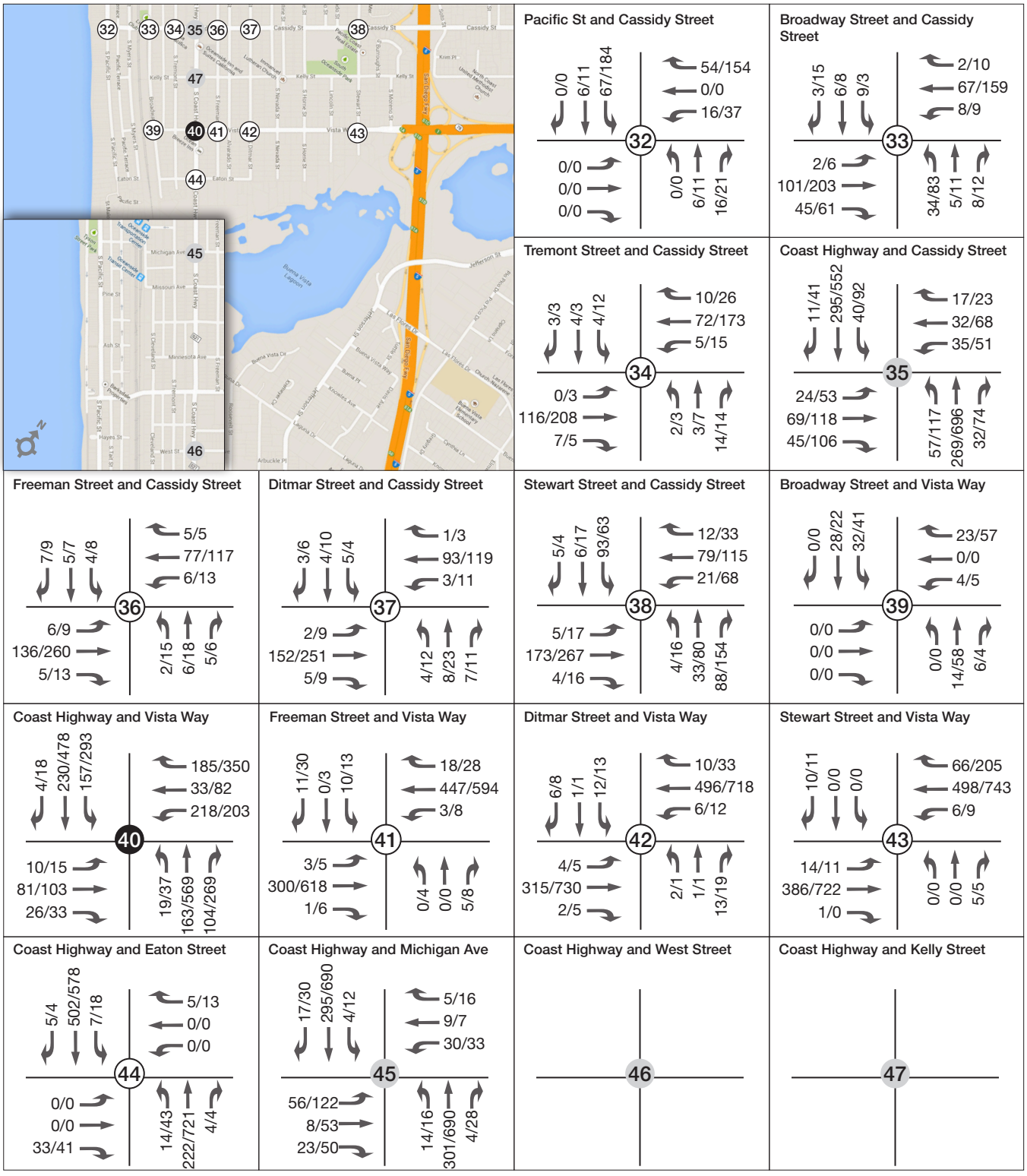


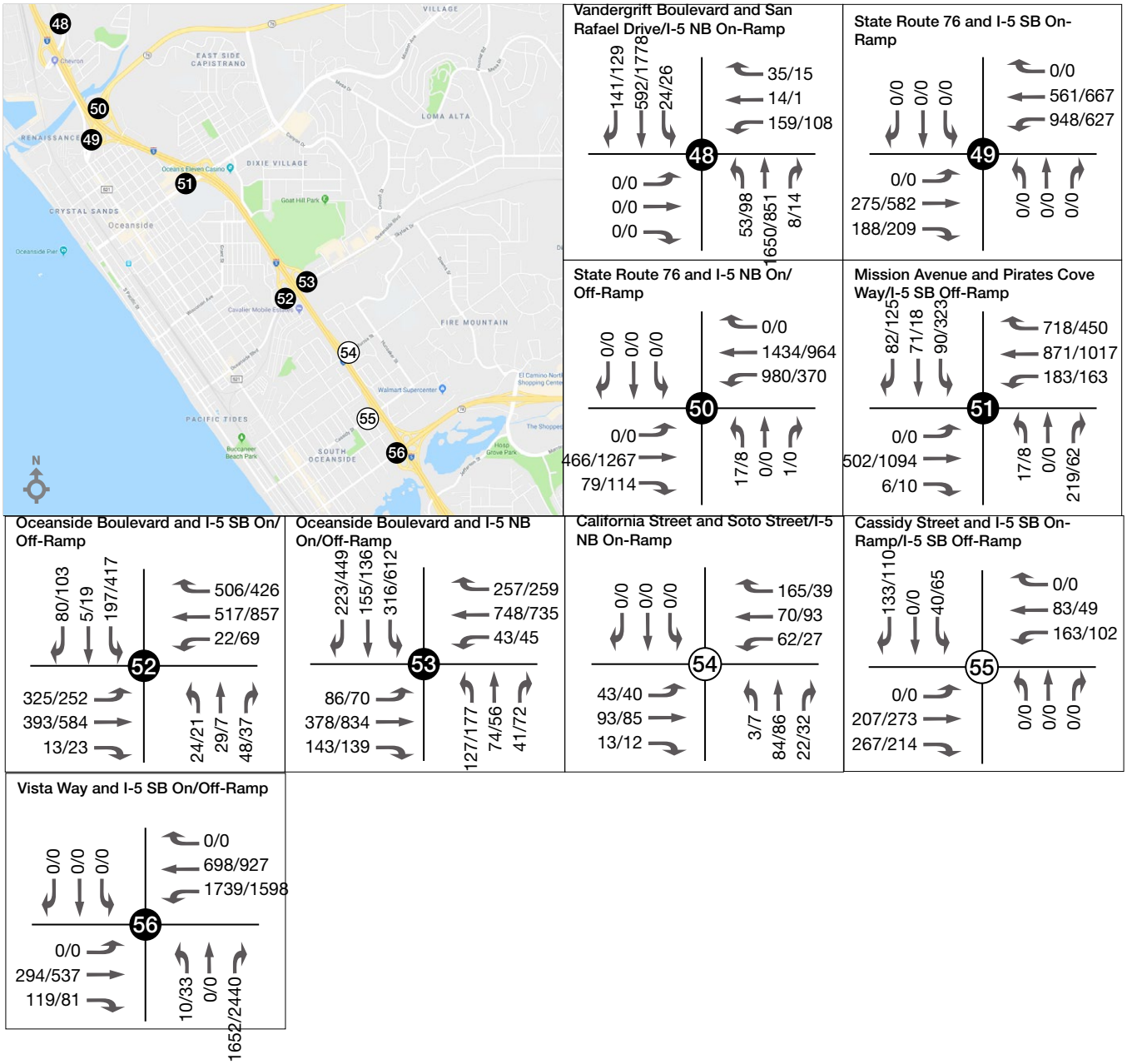
Figure 4-2c Existing with Project Peak Hour Volumes - AM & PM



Note: Existing turning movement volumes not available for Intersections 46 and 47

OCEANSIDE
COAST HIGHWAY
CORRIDOR STUDY

Figure 4-2d Existing with Project Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ● Roundabout Intersections ##/## AM/PM Turning Movement Volume

4.3 Existing Conditions with Project Alternative 1 (Four-Lanes between Oceanside Blvd and Vista Way)

This section examines traffic conditions with the Coast Highway Corridor Project alternative 1 which proposes 2 lanes from Harbor Drive to Oceanside Blvd and four lanes between Oceanside Blvd and Vista Way with seven new roundabouts as described in Section 3.6.3. The analysis was conducted for the existing conditions.

4.3.1 Road Segment Volumes

Road segment volumes have been included in Appendix A for use in noise modeling purposes. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

4.3.2 Intersection Level of Service

This section examines traffic conditions with and without the Coast Highway Corridor Study alternative 1. The analysis was conducted for the existing conditions.

The intersection operations analysis for the existing condition with project alternative 1 was performed consistent with the methodology outlined in Section 3. Table 4-3 presents the results for the existing conditions traffic analysis with project alternative 1. A comparison between the existing condition without and with project alternative 1 is also provided. Figure 4-3 contains the traffic volumes used for the existing conditions with project alternative 1 analysis.

Table 4-3: LOS Analysis – Existing Conditions with Project Alternative 1

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	28.0	C	Signalized	AM	31.1	C	No
			PM	51.3	D		PM	51.3	D	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	13.7	B	RBT	AM	3.1	A	No
			PM	37.1	D		PM	8.6	A	No
3	Surfrider Way - Pacific Street	AWSC	AM	8.5	A	AWSC	AM	8.5	A	No
			PM	11.2	B		PM	10.5	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	10.4	B	Signalized	AM	11.4	B	No
			PM	14.4	B		PM	19.1	B	No
5	Coast Highway - Civic Center Drive	Signalized	AM	13.7	B	RBT	AM	6.1	A	No
			PM	15.1	B		PM	13.3	B	No
6	Coast Highway - Pier View Way	Signalized	AM	16.8	B	RBT	AM	5.6	A	No
			PM	16.6	B		PM	12.9	B	No
7	Pier View Way - Horne Street	AWSC	AM	8.7	A	AWSC	AM	8.7	A	No
			PM	11.9	B		PM	11.9	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	7.9	A	AWSC	AM	7.9	A	No
			PM	10.1	B		PM	10.0	A	No
9	Mission Avenue - Cleveland Street	AWSC	AM	8.1	A	AWSC	AM	8.1	A	No
			PM	10.6	B		PM	10.6	B	No
10	Coast Highway - Mission Avenue	Signalized	AM	13.1	B	Signalized	AM	8.0	A	No
			PM	13.8	B		PM	12.2	B	No

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
11	Mission Avenue - Horne Street	Signalized	AM	7.4	A	Signalized	AM	6.7	A	No
			PM	18.9	B		PM	17.1	B	No
12	Seagaze Street - Tremont Street	SSSC	AM	3.3	A	SSSC	AM	9.1	A	No
			PM	11.5	B		PM	11.5	B	No
13	Coast Highway - Seagaze Street	Signalized	AM	14.7	B	Signalized	AM	16.1	B	No
			PM	23.9	C		PM	27.3	C	No
14	Seagaze Street - Freeman Street	SSSC	AM	10.3	A	SSSC	AM	10.3	B	No
			PM	15.6	C		PM	15.6	C	No
15	Seagaze Street - Ditmar Street	AWSC	AM	7.9	A	AWSC	AM	7.6	A	No
			PM	12.5	B		PM	12.0	B	No
16	Seagaze Street - Clementine Street	SSSC	AM	7.9	A	SSSC	AM	7.5	A	No
			PM	13.1	B		PM	8.3	A	No
17	Coast Highway - Missouri Avenue	SSSC	AM	12.0	B	SSSC	AM	10.0	A	No
			PM	23.9	C		PM	13.5	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	11.3	B	RBT	AM	6.1	A	No
			PM	22.0	C		PM	13.2	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	8.1	A	AWSC	AM	7.8	A	No
			PM	9.8	A		PM	9.5	A	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	10.6	B	SSSC	AM	10.6	B	No
			PM	14.0	B		PM	14.0	B	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	8.9	A	RBT	AM	7.0	A	No
			PM	12.2	B		PM	22.0	C	No
22	Wisconsin Avenue - Freeman Street	SSSC	AM	9.1	A	SSSC	AM	9.1	A	No
			PM	9.7	A		PM	9.7	A	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	9.7	A	SSSC	AM	9.7	A	No
			PM	10.1	B		PM	10.1	B	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	7.5	A	AWSC	AM	7.3	A	No
			PM	7.9	A		PM	7.9	A	No
25	Oceanside Boulevard - Pacific Street	AWSC	AM	8.0	A	AWSC	AM	7.7	A	No
			PM	9.0	A		PM	8.7	A	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	10.9	B	SSSC	AM	11.0	B	No
			PM	14.7	B		PM	14.8	B	No
27	Coast Highway - Oceanside Boulevard	Signalized	AM	29.7	C	Signalized	AM	30.1	C	No
			PM	39.7	D		PM	41.2	D	No
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	5.7	A	Signalized	AM	5.4	A	No
			PM	6.8	A		PM	5.9	A	No
29	Coast Highway - Morse Street	Signalized	AM	9.0	A	Signalized	AM	21.0	C	No
			PM	9.8	A		PM	10.1	A	No
30	Morse Street - Freeman Street	SSSC	AM	9.0	A	SSSC	AM	9.0	A	No
			PM	10.0	B		PM	10.0	B	No
31	Morse Street - Ditmar Street	SSSC	AM	8.8	A	SSSC	AM	8.8	A	No
			PM	9.2	A		PM	9.2	A	No
32	Cassidy Street - Pacific Street	AWSC	AM	7.7	A	AWSC	AM	7.3	A	No
			PM	9.3	A		PM	8.7	A	No

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
33	Cassidy Street - Broadway Street	SSSC	AM	10.3	B	SSSC	AM	10.3	B	No
			PM	14.5	B		PM	14.5	B	No
34	Cassidy Street - Tremont Street	SSSC	AM	9.9	A	SSSC	AM	9.9	A	No
			PM	12.4	B		PM	12.4	B	No
35	Coast Highway - Cassidy Street	Signalized	AM	9.1	A	Signalized	AM	8.9	A	No
			PM	14.0	B		PM	13.2	B	No
36	Cassidy Street - Freeman Street	SSSC	AM	10.2	B	SSSC	AM	10.2	B	No
			PM	12.7	B		PM	12.7	B	No
37	Cassidy Street - Ditmar Street	AWSC	AM	8.1	A	AWSC	AM	7.9	A	No
			PM	9.5	A		PM	9.0	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	9.3	A	AWSC	AM	8.9	A	No
			PM	13.2	B		PM	12.0	B	No
39	Vista Way - Broadway Street	SSSC	AM	7.4	A	SSSC	AM	7.4	A	No
			PM	7.6	A		PM	7.6	A	No
40	Coast Highway - Vista Way	Signalized	AM	22.7	C	Signalized	AM	23.4	C	No
			PM	37.0	D		PM	39.5	D	No
41	Vista Way - Freeman Street	SSSC	AM	12.2	B	SSSC	AM	12.2	B	No
			PM	15.3	C		PM	15.3	C	No
42	Vista Way - Ditmar Street	SSSC	AM	13.0	B	SSSC	AM	13.0	B	No
			PM	18.7	C		PM	18.7	C	No
43	Vista Way - Stewart Street	SSSC	AM	12.3	B	SSSC	AM	12.3	B	No
			PM	17.4	C		PM	17.4	C	No
44	Coast Highway - Eaton Street	SSSC	AM	12.8	B	SSSC	AM	13.1	B	No
			PM	14.3	B		PM	14.5	B	No
45	Coast Highway - Michigan Avenue	Signalized	AM	7.3	A	RBT	AM	6.7	A	No
			PM	9.0	A		PM	22.5	C	No
46	Coast Highway - West Street	SSSC	AM	--	--	RBT	AM	--	--	--
			PM	--	--		PM	--	--	--
47	Coast Highway - Kelly Street	SSSC	AM	--	--	SSSC	AM	--	--	--
			PM	--	--		PM	--	--	--
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	17.6	B	Signalized	AM	17.6	B	No
			PM	22.7	C		PM	22.7	C	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	8.9	A	Signalized	AM	8.9	A	No
			PM	7.0	A		PM	7.0	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	22.4	C	Signalized	AM	22.4	C	No
			PM	25.9	C		PM	25.9	C	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	14.7	B	Signalized	AM	14.7	B	No
			PM	20.7	C		PM	17.6	B	No
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	AM	39.3	D	Signalized	AM	39.3	D	No
			PM	65.3	E		PM	53.1	D	No
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	38.3	D	Signalized	AM	38.3	D	No
			PM	52.4	D		PM	52.4	D	No
54	California - I-5 NB On-Ramp	AWSC	AM	9.2	A	AWSC	AM	9.2	A	No
			PM	8.5	A		PM	8.5	A	No

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	8.9	A	SSSC	AM	8.9	A	No
			PM	8.7	A		PM	8.7	A	No
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	11.0	B	Signalized	AM	11.0	B	No
			PM	11.2	B		PM	11.2	B	No

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. RBT – Roundabout
F. The minimum acceptable LOS is “D” for intersections 1-47
G. The minimum acceptable LOS is “D”; a change from C or D to a lower LOS will cause an impact for intersections 48-56
H. Existing volumes not available for Int 46 and Int 47

It is worth mentioning that delay and LOS does not change for several study intersections since project changes are mainly along Coast Highway. Therefore, intersections outside of Coast Highway will not be affected. All intersections are not impacted by the proposed project alternative 1.

Figure 4-3a Existing with Project Alternative 1 Peak Hour Volumes - AM & PM

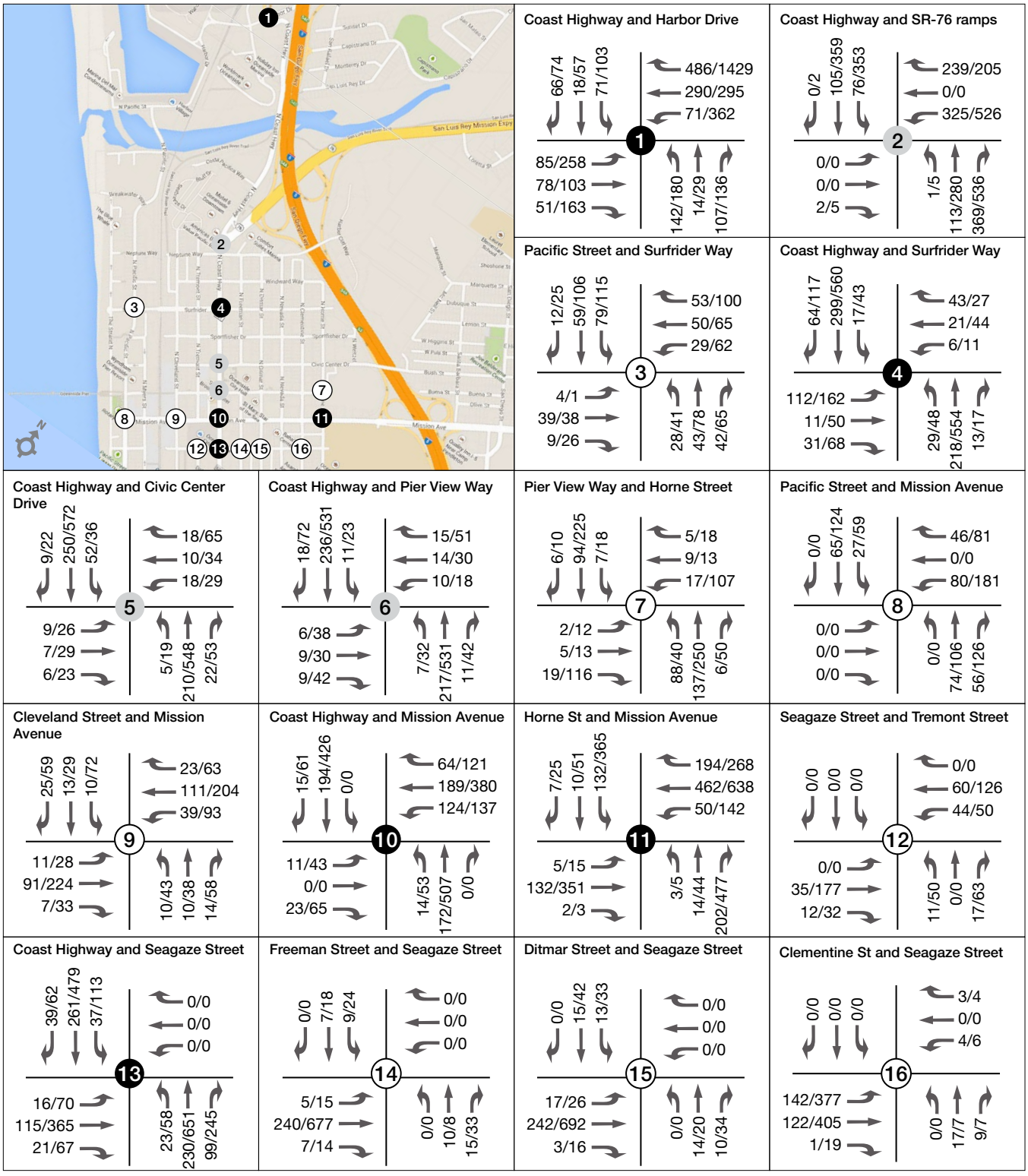
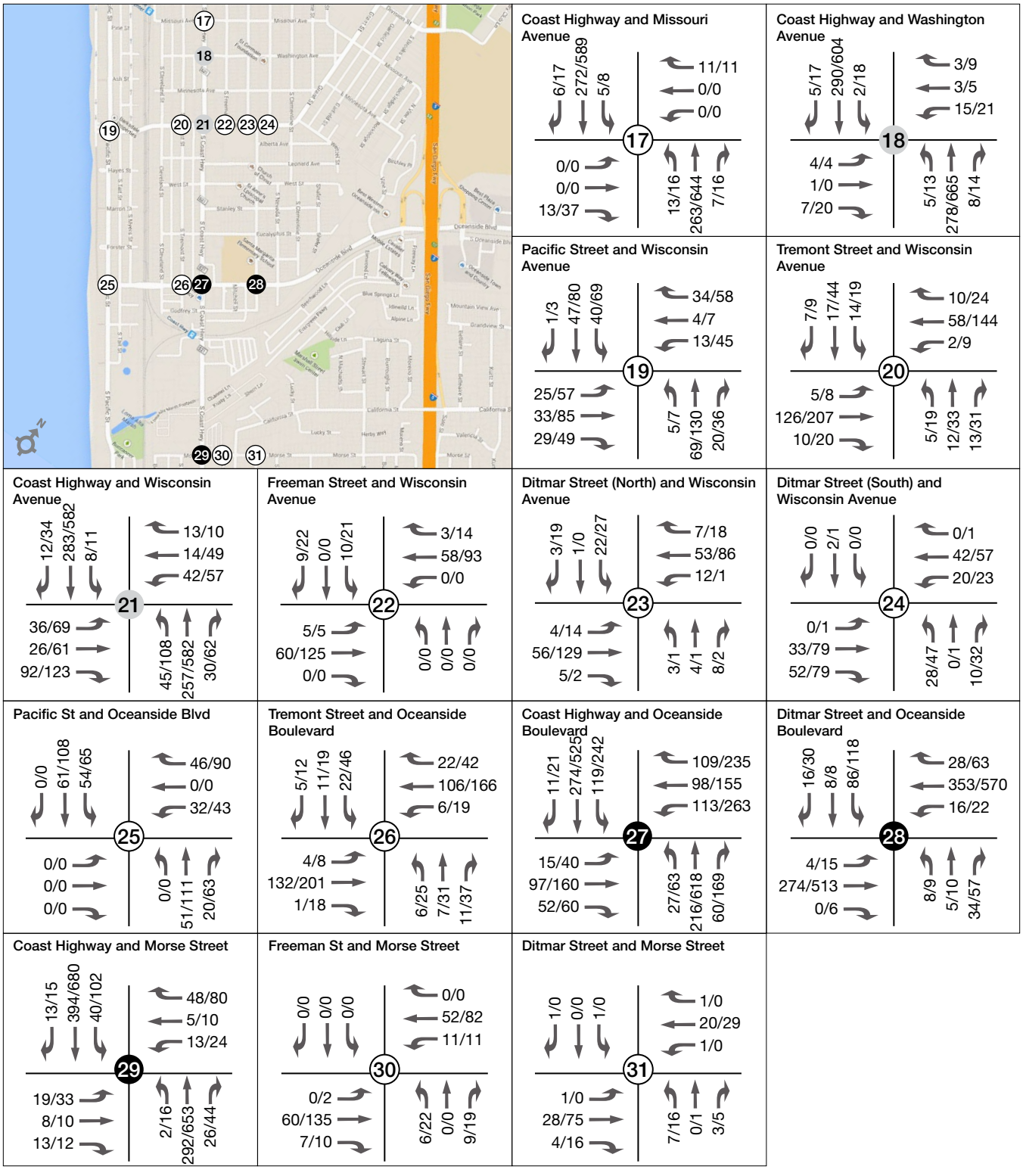


Figure 4-3b Existing with Project Alternative 1 Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ● Roundabout Intersections ##/## AM/PM Turning Movement Volume

Figure 4-3c Existing with Project Alternative 1 Peak Hour Volumes - AM & PM

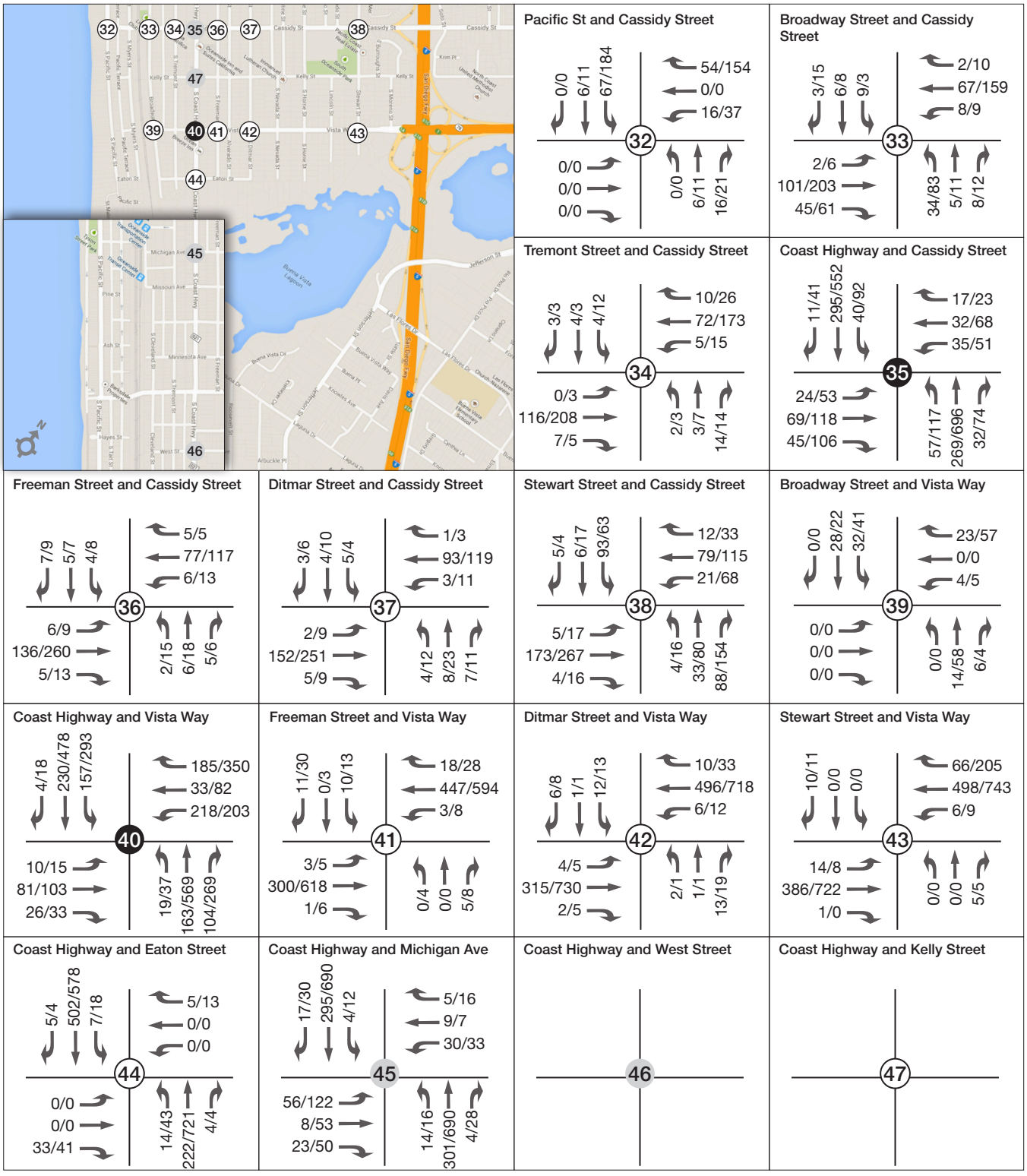
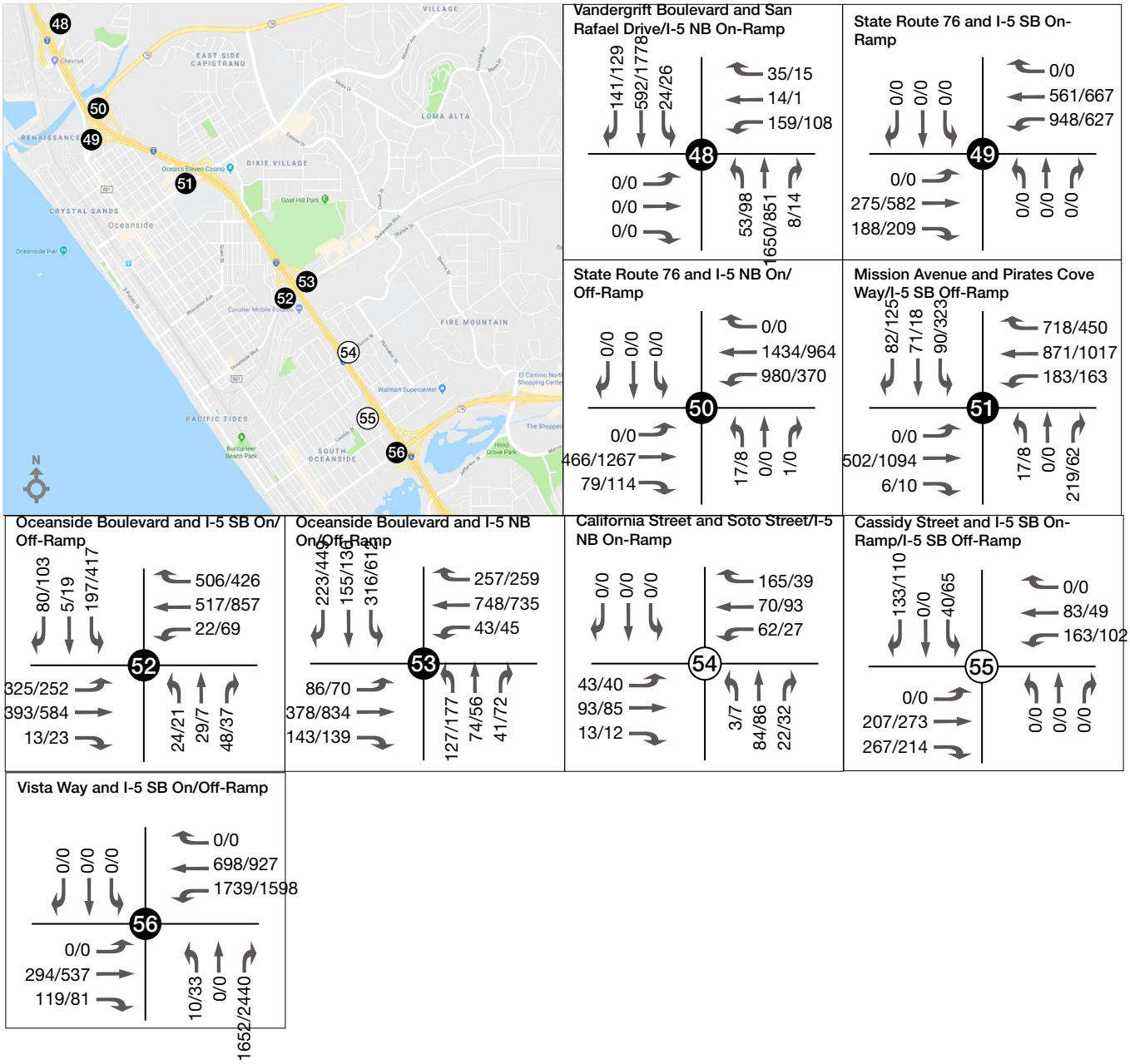


Figure 4-3d Existing with Project Alternative 1 Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ● Roundabout Intersections ##/## AM/PM Turning Movement Volume

4.4 Existing Conditions with Project Alternative 2 (Four-Lanes between Morse St and Vista Way)

This section examines traffic conditions with the Coast Highway Corridor Project alternative 2 which proposes 2 lanes between Harbor Drive and Morse Street and four lanes between Morse St and Vista Way with seven new roundabouts as described in Section 3.6.4. The analysis was conducted for the existing conditions.

4.4.1 Road Segment Volumes

Road segment volumes have been included in Appendix A for use in noise modeling purposes. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

4.4.2 Intersection Level of Service

This section examines traffic conditions with and without the Coast Highway Corridor Study alternative 2. The analysis was conducted for the existing conditions.

The intersection operations analysis for the existing condition with project alternative 2 was performed consistent with the methodology outlined in Section 3. Table 4-4 presents the results for the existing conditions traffic analysis with project alternative 2. A comparison between the existing condition without and with project alternative 2 is also provided. Figure 4-4 contains the traffic volumes used for the existing conditions with project alternative 2 analysis.

Table 4-4: LOS Analysis – Existing Conditions with Project Alternative 2

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	28.0	C	Signalized	AM	31.1	C	No
			PM	51.3	D		PM	51.3	D	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	13.7	B	RBT	AM	3.1	A	No
			PM	37.1	D		PM	8.6	A	No
3	Surfrider Way - Pacific Street	AWSC	AM	8.5	A	AWSC	AM	8.5	A	No
			PM	11.2	B		PM	10.5	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	10.4	B	Signalized	AM	11.4	B	No
			PM	14.4	B		PM	19.1	B	No
5	Coast Highway - Civic Center Drive	Signalized	AM	13.7	B	RBT	AM	6.1	A	No
			PM	15.1	B		PM	13.3	B	No
6	Coast Highway - Pier View Way	Signalized	AM	16.8	B	RBT	AM	5.6	A	No
			PM	16.6	B		PM	12.9	B	No
7	Pier View Way - Horne Street	AWSC	AM	8.7	A	AWSC	AM	8.7	A	No
			PM	11.9	B		PM	11.9	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	7.9	A	AWSC	AM	7.9	A	No
			PM	10.1	B		PM	10.0	A	No
9	Mission Avenue - Cleveland Street	AWSC	AM	8.1	A	AWSC	AM	8.1	A	No
			PM	10.6	B		PM	10.6	B	No
10	Coast Highway - Mission Avenue	Signalized	AM	13.1	B	Signalized	AM	8.0	A	No
			PM	13.8	B		PM	12.2	B	No

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
11	Mission Avenue - Horne Street	Signalized	AM	7.4	A	Signalized	AM	6.7	A	No
			PM	18.9	B		PM	17.1	B	No
12	Seagaze Street - Tremont Street	SSSC	AM	3.3	A	SSSC	AM	9.1	A	No
			PM	11.5	B		PM	11.5	B	No
13	Coast Highway - Seagaze Street	Signalized	AM	14.7	B	Signalized	AM	16.1	B	No
			PM	23.9	C		PM	27.3	C	No
14	Seagaze Street - Freeman Street	SSSC	AM	10.3	A	SSSC	AM	10.3	B	No
			PM	15.6	C		PM	15.6	C	No
15	Seagaze Street - Ditmar Street	AWSC	AM	7.9	A	AWSC	AM	7.6	A	No
			PM	12.5	B		PM	12.0	B	No
16	Seagaze Street - Clementine Street	SSSC	AM	7.9	A	SSSC	AM	7.5	A	No
			PM	13.1	B		PM	8.3	A	No
17	Coast Highway - Missouri Avenue	SSSC	AM	12.0	B	SSSC	AM	10.0	A	No
			PM	23.9	C		PM	13.5	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	11.3	B	RBT	AM	6.1	A	No
			PM	22.0	C		PM	13.2	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	8.1	A	AWSC	AM	7.8	A	No
			PM	9.8	A		PM	9.5	A	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	10.6	B	SSSC	AM	10.6	B	No
			PM	14.0	B		PM	14.0	B	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	8.9	A	RBT	AM	7.0	A	No
			PM	12.2	B		PM	22.0	C	No
22	Wisconsin Avenue - Freeman Street	SSSC	AM	9.1	A	SSSC	AM	9.1	A	No
			PM	9.7	A		PM	9.7	A	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	9.7	A	SSSC	AM	9.7	A	No
			PM	10.1	B		PM	10.1	B	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	7.5	A	AWSC	AM	7.3	A	No
			PM	7.9	A		PM	7.9	A	No
25	Oceanside Boulevard - Pacific Street	AWSC	AM	8.0	A	AWSC	AM	7.7	A	No
			PM	9.0	A		PM	8.7	A	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	10.9	B	SSSC	AM	11.0	B	No
			PM	14.7	B		PM	14.8	B	No
27	Coast Highway - Oceanside Boulevard	Signalized	AM	29.7	C	Signalized	AM	30.1	C	No
			PM	39.7	D		PM	41.2	D	No
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	5.7	A	Signalized	AM	5.4	A	No
			PM	6.8	A		PM	5.9	A	No
29	Coast Highway - Morse Street	Signalized	AM	9.0	A	Signalized	AM	21.0	C	No
			PM	9.8	A		PM	10.1	A	No
30	Morse Street - Freeman Street	SSSC	AM	9.0	A	SSSC	AM	9.0	A	No
			PM	10.0	B		PM	10.0	B	No
31	Morse Street - Ditmar Street	SSSC	AM	8.8	A	SSSC	AM	8.8	A	No
			PM	9.2	A		PM	9.2	A	No
32	Cassidy Street - Pacific Street	AWSC	AM	7.7	A	AWSC	AM	7.3	A	No
			PM	9.3	A		PM	8.7	A	No

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
33	Cassidy Street - Broadway Street	SSSC	AM	10.3	B	SSSC	AM	10.3	B	No
			PM	14.5	B		PM	14.5	B	No
34	Cassidy Street - Tremont Street	SSSC	AM	9.9	A	SSSC	AM	9.9	A	No
			PM	12.4	B		PM	12.4	B	No
35	Coast Highway - Cassidy Street	Signalized	AM	9.1	A	Signalized	AM	8.9	A	No
			PM	14.0	B		PM	13.2	B	No
36	Cassidy Street - Freeman Street	SSSC	AM	10.2	B	SSSC	AM	10.2	B	No
			PM	12.7	B		PM	12.7	B	No
37	Cassidy Street - Ditmar Street	AWSC	AM	8.1	A	AWSC	AM	7.9	A	No
			PM	9.5	A		PM	9.0	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	9.3	A	AWSC	AM	8.9	A	No
			PM	13.2	B		PM	12.0	B	No
39	Vista Way - Broadway Street	SSSC	AM	7.4	A	SSSC	AM	7.4	A	No
			PM	7.6	A		PM	7.6	A	No
40	Coast Highway - Vista Way	Signalized	AM	22.7	C	Signalized	AM	23.4	C	No
			PM	37.0	D		PM	39.5	D	No
41	Vista Way - Freeman Street	SSSC	AM	12.2	B	SSSC	AM	12.2	B	No
			PM	15.3	C		PM	15.3	C	No
42	Vista Way - Ditmar Street	SSSC	AM	13.0	B	SSSC	AM	13.0	B	No
			PM	18.7	C		PM	18.7	C	No
43	Vista Way - Stewart Street	SSSC	AM	12.3	B	SSSC	AM	12.3	B	No
			PM	17.4	C		PM	17.4	C	No
44	Coast Highway - Eaton Street	SSSC	AM	12.8	B	SSSC	AM	13.1	B	No
			PM	14.3	B		PM	14.5	B	No
45	Coast Highway - Michigan Avenue	Signalized	AM	7.3	A	RBT	AM	6.7	A	No
			PM	9.0	A		PM	22.5	C	No
46	Coast Highway - West Street	SSSC	AM	--	--	RBT	AM	--	--	--
			PM	--	--		PM	--	--	--
47	Coast Highway - Kelly Street	SSSC	AM	--	--	SSSC	AM	--	--	--
			PM	--	--		PM	--	--	--
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	17.6	B	Signalized	AM	17.6	B	No
			PM	22.7	C		PM	22.7	C	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	8.9	A	Signalized	AM	8.9	A	No
			PM	7.0	A		PM	7.0	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	22.4	C	Signalized	AM	22.4	C	No
			PM	25.9	C		PM	25.9	C	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	14.7	B	Signalized	AM	14.7	B	No
			PM	20.7	C		PM	17.6	B	No
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	AM	39.3	D	Signalized	AM	**39.3**	D	No
			PM	65.3	E		PM	51.6	D	No
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	38.3	D	Signalized	AM	38.3	D	No
			PM	52.4	D		PM	51.1	D	No
54	California - I-5 NB On-Ramp	AWSC	AM	9.2	A	AWSC	AM	9.2	A	No
			PM	8.5	A		PM	8.5	A	No

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	8.9	A	SSSC	AM	8.9	A	No
			PM	8.7	A		PM	8.7	A	No
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	11.0	B	Signalized	AM	11.0	B	No
			PM	11.2	B		PM	11.2	B	No

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. RBT – Roundabout
F. The minimum acceptable LOS is “D” for intersections 1-47
G. The minimum acceptable LOS is “D”; a change from C or D to a lower LOS will cause an impact for intersections 48-56
H. Existing volumes not available for Int 46 and Int 47

It is worth mentioning that delay and LOS does not change for several study intersections since project changes are mainly along Coast Highway. Therefore, intersections outside of Coast Highway will not be affected. All other intersections are not impacted by the proposed project alternative 2.

Figure 4-4a Existing with Project Alternative 2 Peak Hour Volumes - AM & PM

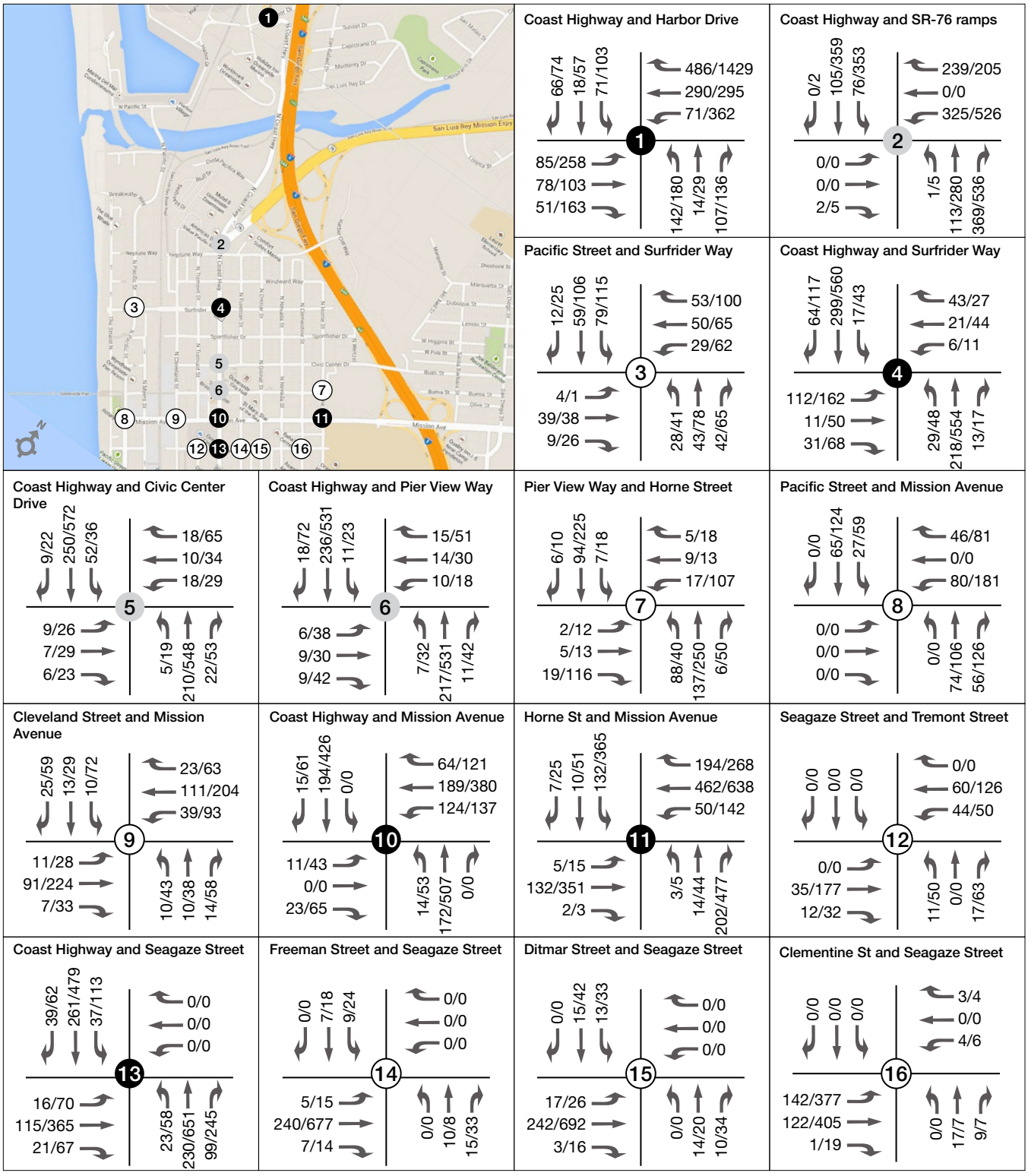
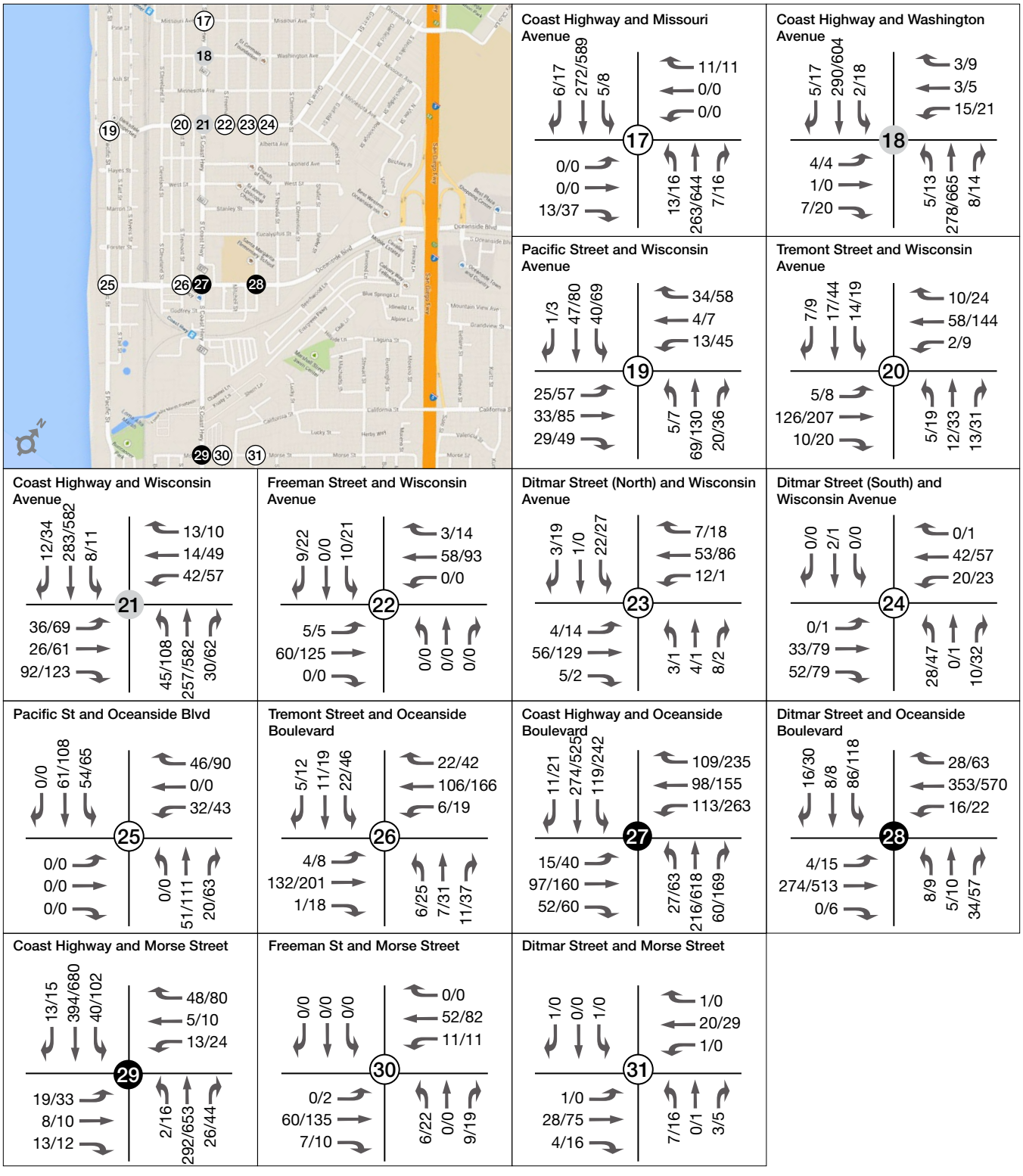


Figure 4-4b Existing with Project Alternative 2 Peak Hour Volumes - AM & PM

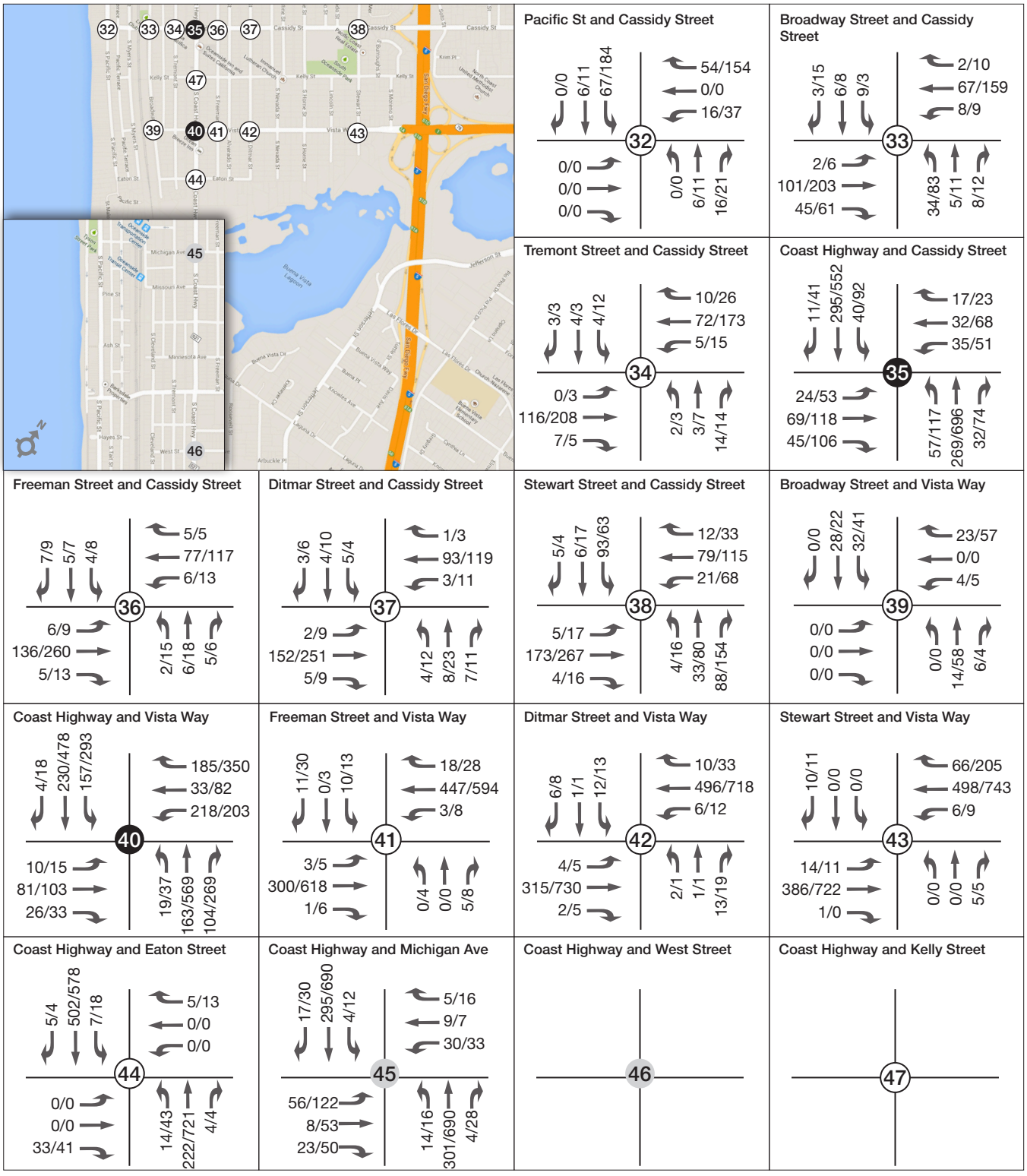


Legend

● Signalized Intersections ○ Unsignalized Intersections ● Roundabout Intersections ##/## AM/PM Turning Movement Volume

OCEANSIDE COAST HIGHWAY CORRIDOR STUDY

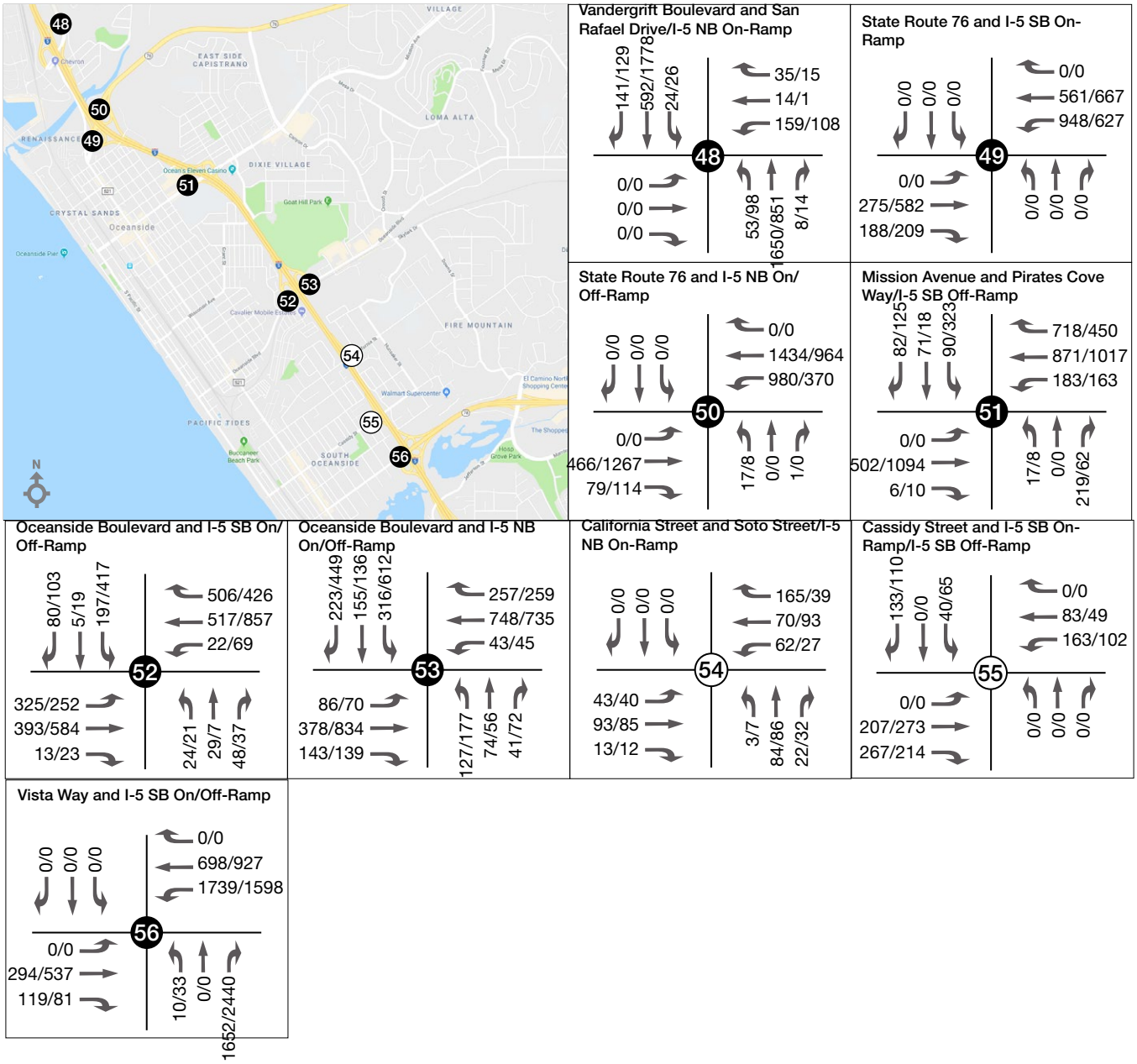
Figure 4-4c Existing with Project Alternative 1 Peak Hour Volumes - AM & PM



Note: Existing turning movement volumes not available for Intersections 46 and 47

OCEANSIDE
COAST HIGHWAY
CORRIDOR STUDY

Figure 4-4d Existing with Project Alternative 2 Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ● Roundabout Intersections ##/## AM/PM Turning Movement Volume

4.5 Existing Conditions with Project Alternative 3 (Four-Lanes between Morse St and Vista Way)

This section examines traffic conditions with the Coast Highway Corridor Project alternative 3 which proposes 2 lanes from Harbor Drive to Morse Street and four lanes between Morse Street and Vista Way with seven new roundabouts as described in Section 3.6.3. The analysis was conducted for the existing conditions. The land use south of Morse Street and west of the I-5 was restored to the general plan land uses.

4.5.1 Road Segment Volumes

Road segment volumes have been included in Appendix A for use in noise modeling purposes. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

4.5.2 Intersection Level of Service

This section examines traffic conditions with and without the Coast Highway Corridor Study alternative 3. The analysis was conducted for the existing conditions.

The intersection operations analysis for the existing condition with project alternative 3 was performed consistent with the methodology outlined in Section 3. Table 4-5 presents the results for the existing conditions traffic analysis with project alternative 3. A comparison between the existing condition without and with project alternative 3 is also provided. Figure 4-5 contains the traffic volumes used for the existing conditions with project alternative 3 analysis.

Table 4-5: LOS Analysis – Existing Conditions with Project Alternative 3

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	28.0	C	Signalized	AM	31.1	C	No
			PM	51.3	D		PM	51.3	D	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	13.7	B	RBT	AM	3.1	A	No
			PM	37.1	D		PM	8.6	A	No
3	Surfrider Way - Pacific Street	AWSC	AM	8.5	A	AWSC	AM	8.5	A	No
			PM	11.2	B		PM	10.5	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	10.4	B	Signalized	AM	11.4	B	No
			PM	14.4	B		PM	19.1	B	No
5	Coast Highway - Civic Center Drive	Signalized	AM	13.7	B	RBT	AM	6.1	A	No
			PM	15.1	B		PM	13.3	B	No
6	Coast Highway - Pier View Way	Signalized	AM	16.8	B	RBT	AM	5.6	A	No
			PM	16.6	B		PM	12.9	B	No
7	Pier View Way - Horne Street	AWSC	AM	8.7	A	AWSC	AM	8.7	A	No
			PM	11.9	B		PM	11.9	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	7.9	A	AWSC	AM	7.9	A	No
			PM	10.1	B		PM	10	A	No
9	Mission Avenue - Cleveland Street	AWSC	AM	8.1	A	AWSC	AM	8.1	A	No
			PM	10.6	B		PM	10.6	B	No
10		Signalized	AM	13.1	B	Signalized	AM	8	A	No

	INTERSECTION	EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
	Coast Highway - Mission Avenue		PM	13.8	B		PM	12.2	B	No
11	Mission Avenue - Horne Street	Signalized	AM	7.4	A	Signalized	AM	6.7	A	No
			PM	18.9	B		PM	17.1	B	No
12	Seagaze Street - Tremont Street	SSSC	AM	3.3	A	SSSC	AM	9.1	A	No
			PM	11.5	B		PM	11.5	B	No
13	Coast Highway - Seagaze Street	Signalized	AM	14.7	B	Signalized	AM	16.1	B	No
			PM	23.9	C		PM	27.3	C	No
14	Seagaze Street - Freeman Street	SSSC	AM	10.3	A	SSSC	AM	10.3	B	No
			PM	15.6	C		PM	15.6	C	No
15	Seagaze Street - Ditmar Street	AWSC	AM	7.9	A	AWSC	AM	7.6	A	No
			PM	12.5	B		PM	12	B	No
16	Seagaze Street - Clementine Street	SSSC	AM	7.9	A	SSSC	AM	7.5	A	No
			PM	13.1	B		PM	8.3	A	No
17	Coast Highway - Missouri Avenue	SSSC	AM	12.0	B	SSSC	AM	10	A	No
			PM	23.9	C		PM	13.5	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	11.3	B	RBT	AM	6.1	A	No
			PM	22.0	C		PM	13.2	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	8.1	A	AWSC	AM	7.8	A	No
			PM	9.8	A		PM	9.5	A	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	10.6	B	SSSC	AM	10.6	B	No
			PM	14.0	B		PM	14	B	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	8.9	A	RBT	AM	7	A	No
			PM	12.2	B		PM	22	C	No
22	Wisconsin Avenue - Freeman Street	SSSC	AM	9.1	A	SSSC	AM	9.1	A	No
			PM	9.7	A		PM	9.7	A	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	9.7	A	SSSC	AM	9.7	A	No
			PM	10.1	B		PM	10.1	B	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	7.5	A	AWSC	AM	7.3	A	No
			PM	7.9	A		PM	7.9	A	No
25	Oceanside Boulevard - Pacific Street	AWSC	AM	8.0	A	AWSC	AM	7.7	A	No
			PM	9.0	A		PM	8.7	A	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	10.9	B	SSSC	AM	11	B	No
			PM	14.7	B		PM	14.8	B	No
27	Coast Highway - Oceanside Boulevard	Signalized	AM	29.7	C	Signalized	AM	30.1	C	No
			PM	39.7	D		PM	41.2	D	No
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	5.7	A	Signalized	AM	5.4	A	No
			PM	6.8	A		PM	5.9	A	No
29	Coast Highway - Morse Street	Signalized	AM	9.0	A	Signalized	AM	21	C	No
			PM	9.8	A		PM	10.1	A	No
30	Morse Street - Freeman Street	SSSC	AM	9.0	A	SSSC	AM	9	A	No
			PM	10.0	B		PM	10	B	No
31	Morse Street - Ditmar Street	SSSC	AM	8.8	A	SSSC	AM	8.8	A	No
			PM	9.2	A		PM	9.2	A	No

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
32	Cassidy Street - Pacific Street	AWSC	AM	7.7	A	AWSC	AM	7.3	A	No
			PM	9.3	A		PM	8.7	A	No
33	Cassidy Street - Broadway Street	SSSC	AM	10.3	B	SSSC	AM	10.3	B	No
			PM	14.5	B		PM	14.5	B	No
34	Cassidy Street - Tremont Street	SSSC	AM	9.9	A	SSSC	AM	9.9	A	No
			PM	12.4	B		PM	12.4	B	No
35	Coast Highway - Cassidy Street	Signalized	AM	9.1	A	Signalized	AM	8.9	A	No
			PM	14.0	B		PM	13.2	B	No
36	Cassidy Street - Freeman Street	SSSC	AM	10.2	B	SSSC	AM	10.2	B	No
			PM	12.7	B		PM	12.7	B	No
37	Cassidy Street - Ditmar Street	AWSC	AM	8.1	A	AWSC	AM	7.9	A	No
			PM	9.5	A		PM	9	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	9.3	A	AWSC	AM	8.9	A	No
			PM	13.2	B		PM	12	B	No
39	Vista Way - Broadway Street	SSSC	AM	7.4	A	SSSC	AM	7.4	A	No
			PM	7.6	A		PM	7.6	A	No
40	Coast Highway - Vista Way	Signalized	AM	22.7	C	Signalized	AM	23.4	C	No
			PM	37.0	D		PM	39.5	D	No
41	Vista Way - Freeman Street	SSSC	AM	12.2	B	SSSC	AM	12.2	B	No
			PM	15.3	C		PM	15.3	C	No
42	Vista Way - Ditmar Street	SSSC	AM	13.0	B	SSSC	AM	13	B	No
			PM	18.7	C		PM	18.7	C	No
43	Vista Way - Stewart Street	SSSC	AM	12.3	B	SSSC	AM	12.3	B	No
			PM	17.4	C		PM	17.4	C	No
44	Coast Highway - Eaton Street	SSSC	AM	12.8	B	SSSC	AM	13.1	B	No
			PM	14.3	B		PM	14.5	B	No
45	Coast Highway - Michigan Avenue	Signalized	AM	7.3	A	RBT	AM	6.7	A	No
			PM	9.0	A		PM	22.5	C	No
46	Coast Highway - West Street	SSSC	AM	--	--	RBT	AM	--	--	--
			PM	--	--		PM	--	--	--
47	Coast Highway - Kelly Street	SSSC	AM	--	--	SSSC	AM	--	--	--
			PM	--	--		PM	--	--	--
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	17.6	B	Signalized	AM	17.6	B	No
			PM	22.7	C		PM	22.7	C	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	8.9	A	Signalized	AM	8.5	A	No
			PM	7.0	A		PM	6.8	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	22.4	C	Signalized	AM	37.4	D	Yes
			PM	25.9	C		PM	22.5	C	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	14.7	B	Signalized	AM	14.2	B	No
			PM	20.7	C		PM	17.7	B	No
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	AM	39.3	D	Signalized	AM	36.4	D	No
			PM	65.3	E		PM	56.3	D	No
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	38.3	D	Signalized	AM	34.5	C	No
			PM	52.4	D		PM	58.7	E	Yes

INTERSECTION		EXISTING WITHOUT PROJECT				EXISTING WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
54	California - I-5 NB On-Ramp	AWSC	AM	9.2	A	AWSC	AM	9.5	A	No
			PM	8.5	A		PM	8.5	A	No
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	8.9	A	SSSC	AM	8.9	A	No
			PM	8.7	A		PM	8.7	A	No
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	11.0	B	Signalized	AM	11.0	B	No
			PM	11.2	B		PM	11.2	B	No

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. RBT – Roundabout
F. The minimum acceptable LOS is “D” for intersections 1-47
G. The minimum acceptable LOS is “D”; a change from C or D to a lower LOS will cause an impact for intersections 48-56
H. Existing volumes not available for Int 46 and Int 47

It is worth mentioning that delay and LOS does not change for several study intersections since project changes are mainly along Coast Highway. Therefore, intersections outside of Coast Highway will not be affected. All other intersections are not impacted by the proposed project alternative 3.

Figure 4-5a Existing with Project Alternative 3 Peak Hour Volumes - AM & PM

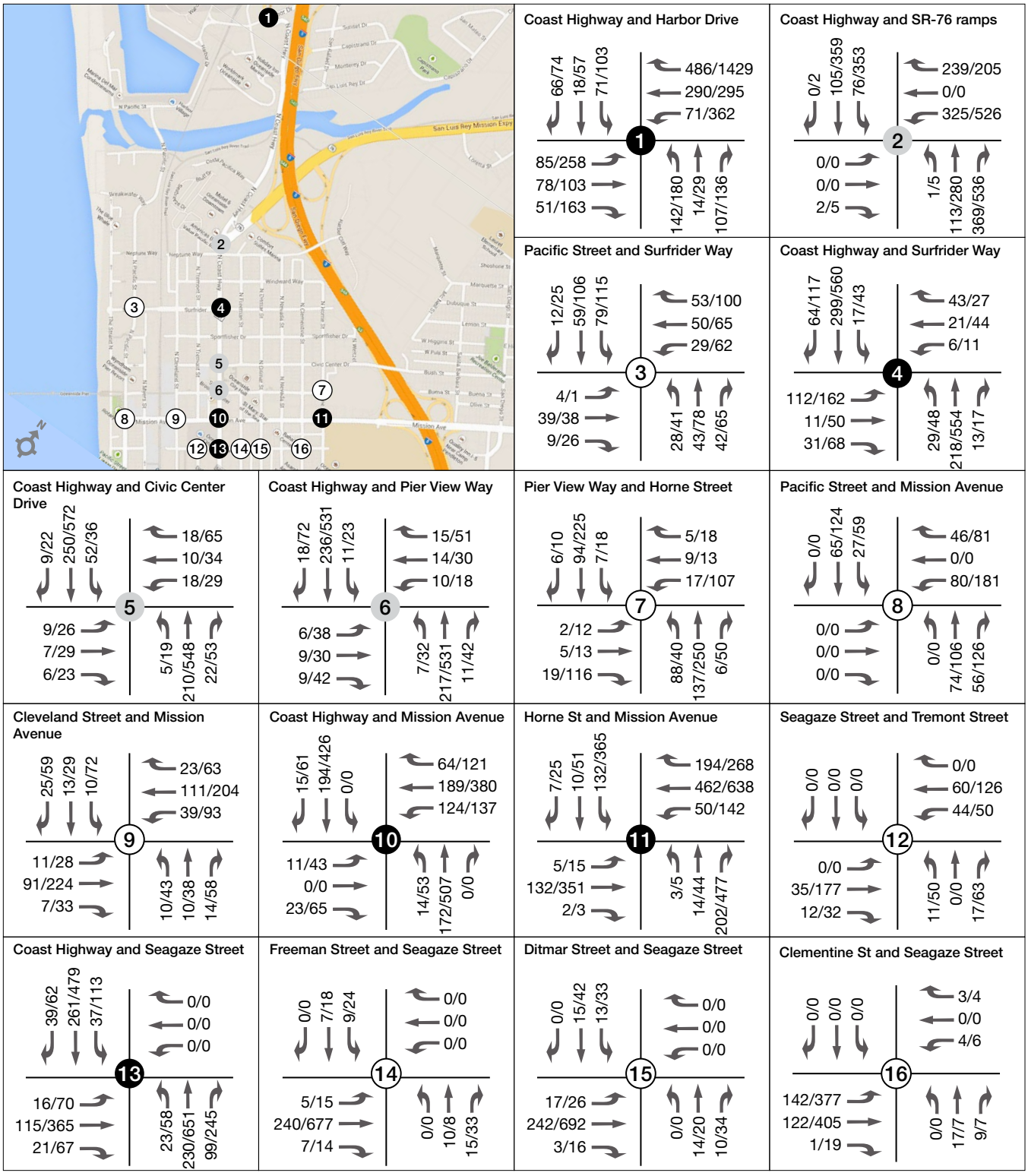
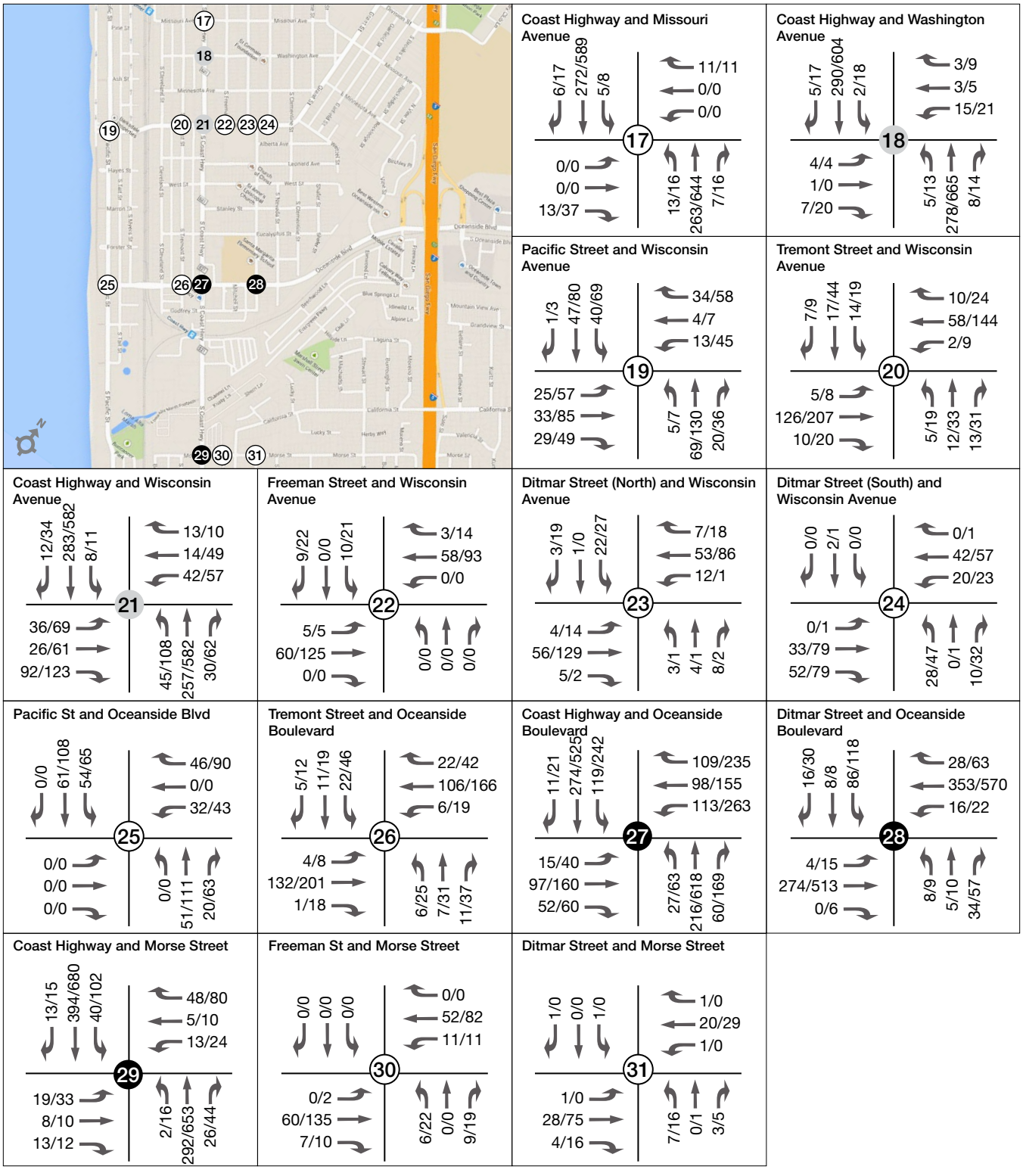


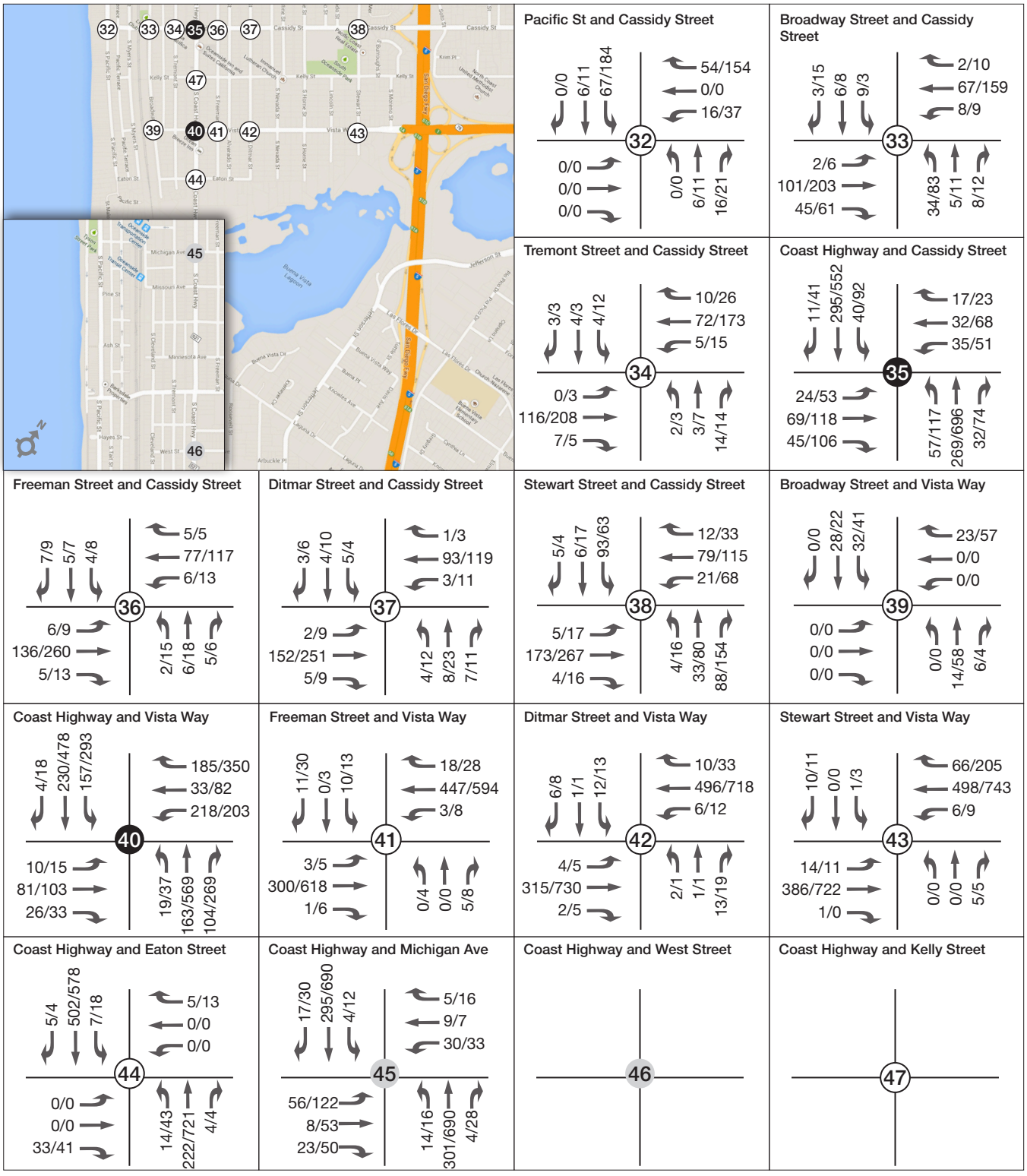
Figure 4-5b Existing with Project Alternative 3 Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ● Roundabout Intersections ##/## AM/PM Turning Movement Volume

Figure 4-5c Existing with Project Alternative 2 Peak Hour Volumes - AM & PM



Note: Existing turning movement volumes not available for Intersections 46 and 47

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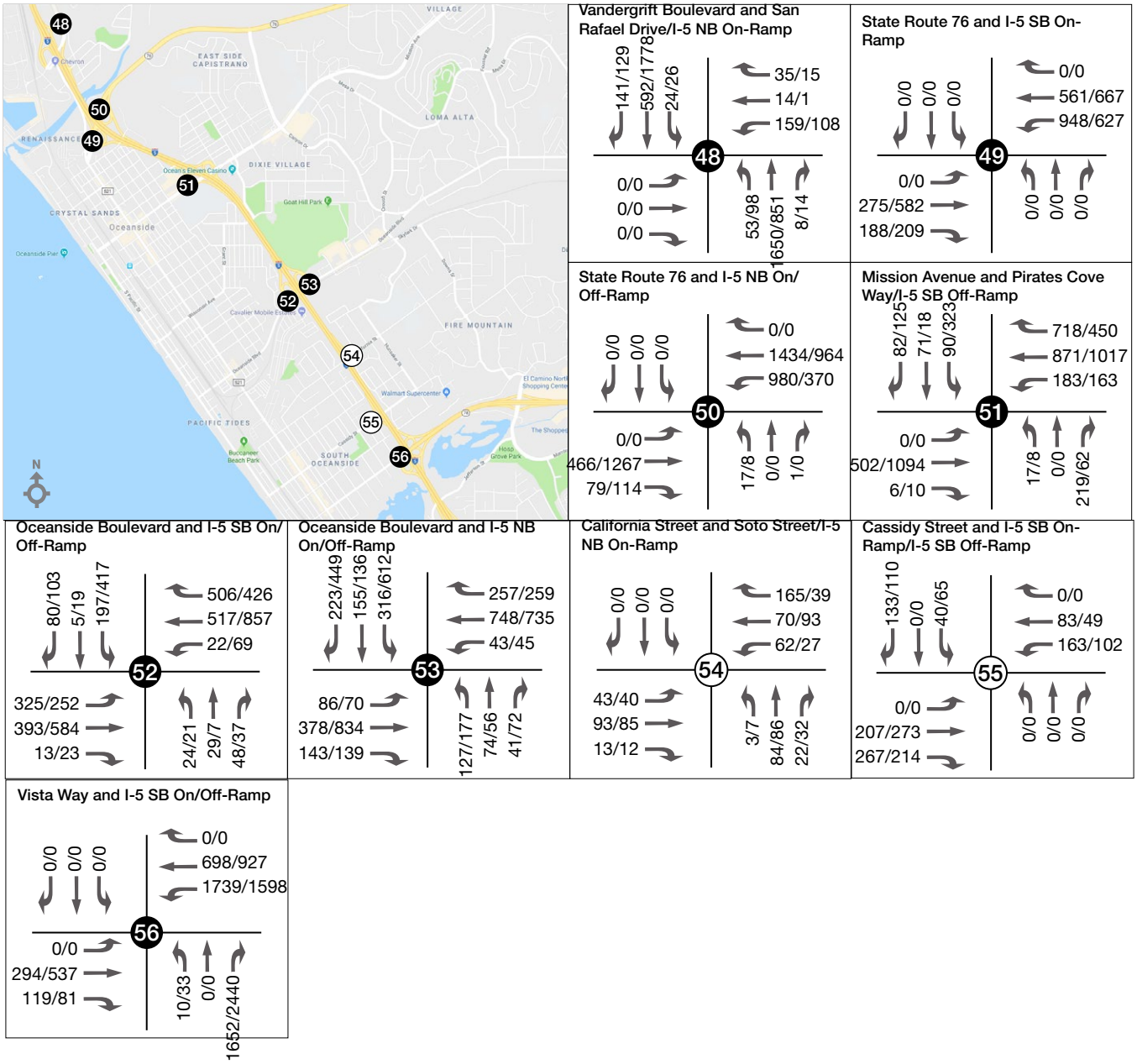
Figure 4-5d Existing with Project Alternative 3 Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

5 Future 2035 Conditions

This section provides a review of the future (2035) roadway system in the study area, the traffic volumes for the study intersections and key road segments, and presents the level of service analyses for the future (2035) conditions scenario.

As discussed in Section 2, the proposed project would transform Coast Highway into a complete street that accommodates all modes of travel in a safe and efficient manner. The key elements of the proposed project include a continuous Class II striped bicycle lane from Harbor Drive to the South City Limit, additional mid-block crosswalks, roundabouts in place of traffic signals, and other enhancements to landscaping and/or the roadway.

It is important to note, the future (2035) roadway system assumes buildout of the Vista Way/SR-78 & I-5 Interchange project which includes HOV lanes and ramps. To provide a complete and comprehensive approach, analyses were also conducted without the buildout of the Vista Way/SR-78 & I-5 Interchange project which does not include HOV lanes and ramps (existing configuration) for each of the analysis scenarios (No Project, With Project, Alternative 1, Alternative 2, and Alternative 3). The buildout and existing Vista Way/SR-78 & I-5 Interchange configurations are listed below:

- Existing Vista Way/SR-78 & I-5 Interchange
    - I-5 on/off-ramps and general lanes
        - I-5 HOV lanes terminate just north of SR-78 interchange
    - SR-78 general lanes
    - I-5 NB and SR-78 ramps
- Buildout Vista Way/SR-78 & I-5 Interchange
    - I-5 on/off-ramps and general lanes/HOV lanes
        - I-5 HOV lanes throughout City of Oceanside
    - SR-78 general lanes/HOV lanes
    - I-5 NB and SR-78 ramps/HOV ramps

This section covers the following scenarios:

- Future Baseline (No Project) Conditions – Year 2035 analysis without project including:
    - Four-lane roadway throughout the Coast Highway corridor
    - General Plan land uses consistent with SANDAG's 2035 growth forecast
- Future Conditions with Project – Year 2035 analysis with project including:
    - Two-lane roadway throughout the Coast Highway corridor with roundabouts
    - Modified Vision Plan land uses
- Future Conditions with Project Alternative 1 – Year 2035 analysis with project including:
    - Two-lane roadway with roundabouts from Harbor Blvd to Oceanside Blvd and four-lane roadway with traffic signals south of Oceanside Blvd
    - Modified Vision Plan land uses
- Future Conditions with Project Alternative 2 – Year 2035 analysis with project including:

  - Two-lane roadway with roundabouts from Harbor Blvd to Morse St and four-lane roadway with traffic signals south of Morse St
  - Modified Vision Plan land uses
- Future Conditions with Project Alternative 3 – Year 2035 analysis with project including:
  - Two-lane roadway with roundabouts from Harbor Blvd to Morse Street and four-lane roadway with traffic signals south of Morse Street
  - Modified Vision Plan land uses north of Morse Street
  - General Plan land uses south of Morse St

5.1 Year 2035 Future Baseline (No Project) – General Plan

This section examines traffic conditions without the Coast Highway Corridor Project and includes 4 lanes throughout the corridor. The analysis was conducted for Future (2035) under the adopted General Plan conditions.

5.1.1 Road Segment Volumes

Road segment volumes have been included in Appendix A for use in noise modeling purposes. Future road segment volumes are extracted from SANDAG's regional model. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

5.1.2 Intersection Level of Service

The intersection operations analysis for the future condition without project was performed consistent with the methodology outlined in Section 3. Of the 56 intersections analyzed in the study area, two intersections are projected to operate at a LOS of E or F. Table 5-1 presents the results for the future conditions traffic analysis without the proposed project. Figure 5-1 contains the traffic volumes used for the future condition analysis.

Table 5-1: LOS Analysis – Future Conditions without Project

INTERSECTION		TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
			Delay (s)	LOS	Delay (s)	LOS
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	30.4	C	**65.3**	**E**
2	Coast Highway - SR-76 Ramps	Signalized	13.3	B	27.7	C
3	Surfrider Way - Pacific Street	AWSC	9.7	A	14.5	B
4	Coast Highway - Surfrider Way	Signalized	12.8	B	15.6	B
5	Coast Highway - Civic Center Drive	Signalized	26.8	C	14.6	B
6	Coast Highway - Pier View Way	Signalized	13.6	B	12.5	B
7	Pier View Way - Horne Street	AWSC	9.2	A	15.6	C
8	Mission Avenue - Pacific Street	AWSC	9.2	A	17.3	C
9	Mission Avenue - Cleveland Street	Signalized	30.4	C	18.5	B
10	Coast Highway - Mission Avenue	Signalized	10.6	B	14.0	B
11	Mission Avenue - Horne Street	Signalized	7.1	A	12.1	B
12	Seagaze Street - Tremont Street	SSSC	10.1	B	22.2	C
13	Coast Highway - Seagaze Street	Signalized	18.7	B	23.9	C
14	Seagaze Street - Freeman Street	SSSC	10.0	B	14.4	B
15	Seagaze Street - Ditmar Street	AWSC	8.5	A	33.3	D

INTERSECTION		TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
			Delay (s)	LOS	Delay (s)	LOS
16	Seagaze Street - Clementine Street	SSSC	8.1	A	14.1	B
17	Coast Highway - Missouri Avenue	SSSC	13.1	B	33.7	D
18	Coast Highway - Washington Avenue	SSSC	12.4	B	31.9	D
19	Wisconsin Avenue - Pacific Street	AWSC	9.7	A	28.7	D
20	Wisconsin Avenue - Tremont Street	SSSC	11.5	B	18.4	C
21	Coast Highway - Wisconsin Avenue	Signalized	10.6	B	19.3	B
22	Wisconsin Avenue - Freeman Street	SSSC	9.0	A	9.5	A
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	9.6	A	9.8	A
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	7.5	A	7.8	A
25	Oceanside Boulevard - Pacific Street	AWSC	8.4	A	9.8	A
26	Oceanside Boulevard - Tremont Street	SSSC	12.4	B	24.6	C
27	Coast Highway - Oceanside Boulevard	Signalized	16.4	B	**58.5**	**E**
28	Oceanside Boulevard - Ditmar Street	Signalized	19.1	B	8.1	A
29	Coast Highway - Morse Street	Signalized	16.4	B	15.5	B
30	Morse Street - Freeman Street	SSSC	9.8	A	13.1	B
31	Morse Street - Ditmar Street	SSSC	9.1	A	10.0	B
32	Cassidy Street - Pacific Street	AWSC	8.1	A	11.1	B
33	Cassidy Street - Broadway Street	SSSC	11.5	B	23.8	C
34	Cassidy Street - Tremont Street	SSSC	10.1	B	13.1	B
35	Coast Highway - Cassidy Street	Signalized	15.5	B	19.6	B
36	Cassidy Street - Freeman Street	SSSC	11.7	B	21.2	C
37	Cassidy Street - Ditmar Street	AWSC	8.7	A	11.6	B
38	Cassidy Street - Stewart Street	AWSC	11.0	B	24.5	C
39	Vista Way - Broadway Street	SSSC	7.8	A	8.2	A
40	Coast Highway - Vista Way	Signalized	25.0	C	45.1	D
41	Vista Way - Freeman Street	SSSC	13.5	B	20.0	C
42	Vista Way - Ditmar Street	SSSC	14.8	B	25.0	D
43	Vista Way - Stewart Street	SSSC	13.2	B	20.2	C
44	Coast Highway - Eaton Street	SSSC	14.4	B	16.2	C
45	Coast Highway - Michigan Avenue	Signalized	7.5	A	6.6	A
46	Coast Highway - West Street	SSSC	11.4	B	18.0	C
47	Coast Highway - Kelly Street	SSSC	10.2	B	13.9	B
48	Harbor/Vandegrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	15	B	36.6	D
49	SR-76 - I-5 SB On-Ramp	Signalized	4.8	A	4.5	A
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	21.5	C	22.4	C
51	Mission - I-5 SB Off-Ramp	Signalized	1.5	B	13.5	B
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	43.5	D	42.4	D
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	39.8	D	65.3	E
54	California - I-5 NB On-Ramp	AWSC	7.6	A	7.5	A
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	9.2	A	9.3	A
56	Vista Way - I-5 SB On/Off-Ramp	Signalized	20.4	C	25.7	C

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. The minimum acceptable LOS is “D” for intersections 1-47
F. The minimum acceptable LOS is “D”; a change from C or D to a lower LOS will cause an impact for intersections 48-56

Two intersections were identified to operate below the minimum acceptable LOS D during the PM peak hour in the future baseline condition. The following intersections each would operate worse than LOS D for the PM period.

- Coast Highway and Harbor Drive / I-5 Ramps (#1)
- Coast Highway and Oceanside Boulevard (#27)
- Oceanside Boulevard and I-5 NB On-/Off-Ramp (#53)

All other intersections would operate at LOS D or better during both peak hours.

5.1.3 Vista Way/SR-78 & I-5 Existing Configuration

This section examines traffic conditions with the Coast Highway Corridor Project which includes 4 lanes throughout the corridor and assumes existing network conditions for the Vista Way/SR-78 and I-5 Interchange. The analysis was conducted for future (2035) conditions.

5.1.3.1 Road Segment Volumes

Road segment volumes have been included in Appendix A for use in noise modeling purposes. Future road segment volumes are extracted from SANDAG's regional model. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

5.1.3.2 Intersection Level of Service

The intersection operations analysis for the future condition without project was performed consistent with the methodology outlined in Section 3. Table 5-2 presents the results for the future conditions traffic analysis without the proposed project under existing Vista Way/SR-78 & I-5 Interchange configuration. Figure 5-2 contains the traffic volumes used for the future condition analysis.

Table 5-2 presents the results for the future conditions traffic analysis without the proposed project. Figure 5-2 contains the traffic volumes used for the future condition analysis.

Table 5-2: LOS Analysis – Future Conditions without Project (Existing SR-78)

INTERSECTION		TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
			Delay (s)	LOS	Delay (s)	LOS
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	31.1	C	**68.9**	**E**
2	Coast Highway - SR-76 Ramps	Signalized	12.7	B	25.6	C
3	Surfrider Way - Pacific Street	AWSC	10.4	B	19.5	C
4	Coast Highway - Surfrider Way	Signalized	16.4	B	17.1	B
5	Coast Highway - Civic Center Drive	Signalized	13.2	B	15.6	B
6	Coast Highway - Pier View Way	Signalized	19.2	B	8.7	A
7	Pier View Way - Horne Street	AWSC	9.4	A	17.6	C
8	Mission Avenue - Pacific Street	AWSC	9.5	A	19.4	C
9	Mission Avenue - Cleveland Street	Signalized	18.8	B	17.7	B
10	Coast Highway - Mission Avenue	Signalized	12	B	12.8	B
11	Mission Avenue - Horne Street	Signalized	6.9	A	10.7	B
12	Seagaze Street - Tremont Street	SSSC	9.8	A	17.1	C
13	Coast Highway - Seagaze Street	Signalized	15.8	B	22.7	C
14	Seagaze Street - Freeman Street	SSSC	10.1	B	15	B
15	Seagaze Street - Ditmar Street	AWSC	8.6	A	30.2	D
16	Seagaze Street - Clementine Street	SSSC	8.3	A	17.7	C
17	Coast Highway - Missouri Avenue	SSSC	10.8	B	15.7	C
18	Coast Highway - Washington Avenue	SSSC	9.9	A	13.8	B
19	Wisconsin Avenue - Pacific Street	AWSC	10.1	B	**51.3**	**F**
20	Wisconsin Avenue - Tremont Street	SSSC	10.8	B	14.9	B
21	Coast Highway - Wisconsin Avenue	Signalized	14.5	B	24.5	C
22	Wisconsin Avenue - Freeman Street	SSSC	11.5	B	19.4	C
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	13.2	B	17.9	C

INTERSECTION		TRAFFIC CONTROL	AM PEAK HOUR		PM PEAK HOUR	
			Delay (s)	LOS	Delay (s)	LOS
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	9.5	A	23.7	C
25	Oceanside Boulevard - Pacific Street	AWSC	9.1	A	12.1	B
26	Oceanside Boulevard - Tremont Street	SSSC	14.3	B	**91**	**F**
27	Coast Highway - Oceanside Boulevard	Signalized	26.2	C	32.1	C
28	Oceanside Boulevard - Ditmar Street	Signalized	14.9	B	15.3	B
29	Coast Highway - Morse Street	Signalized	19.6	B	22.9	C
30	Morse Street - Freeman Street	SSSC	12.9	B	**112.9**	**F**
31	Morse Street - Ditmar Street	SSSC	9.5	A	11.5	B
32	Cassidy Street - Pacific Street	AWSC	8.6	A	16.8	C
33	Cassidy Street - Broadway Street	SSSC	16	C	**397.4**	**F**
34	Cassidy Street - Tremont Street	SSSC	10.1	B	13.1	B
35	Coast Highway - Cassidy Street	Signalized	18.5	B	20	C
36	Cassidy Street - Freeman Street	SSSC	21.4	C	**OVF**	**F**
37	Cassidy Street - Ditmar Street	AWSC	7.6	A	8.6	A
38	Cassidy Street - Stewart Street	AWSC	9.2	A	13.8	B
39	Vista Way - Broadway Street	SSSC	8.5	A	9.4	A
40	Coast Highway - Vista Way	Signalized	32.8	C	**78.9**	**E**
41	Vista Way - Freeman Street	SSSC	34	D	**OVF**	**F**
42	Vista Way - Ditmar Street	SSSC	26.2	D	**294.2**	**F**
43	Vista Way - Stewart Street	SSSC	22	C	**69.1**	**F**
44	Coast Highway - Eaton Street	SSSC	14.9	B	17.4	C
45	Coast Highway - Michigan Avenue	Signalized	4.7	A	5.4	A
46	Coast Highway - West Street	SSSC	9.6	A	11.2	B
47	Coast Highway - Kelly Street	SSSC	10	B	12.7	B
48	Harbor/Vandegrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	15	B	37.4	D
49	SR-76 - I-5 SB On-Ramp	Signalized	4.9	A	4.5	A
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	25.4	C	27.8	C
51	Mission - I-5 SB Off-Ramp	Signalized	11.6	B	13.8	BC
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	50.2	D	42.6	D
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	37.7	D	65.7	E
54	California - I-5 NB On-Ramp	AWSC	7.6	A	7.6	A
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	9.3	A	9.5	A
56	Vista Way - I-5 SB On/Off-Ramp	Signalized	25.8	C	**88**	**F**

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. OVF – Overflow, Synchro is unable to calculate a level of delay
F. RBT – Roundabout
G. The minimum acceptable LOS is “D” for intersections 1-47
H. The minimum acceptable LOS is “D”; a change from C or D to a lower LOS will cause an impact for intersections 48-56

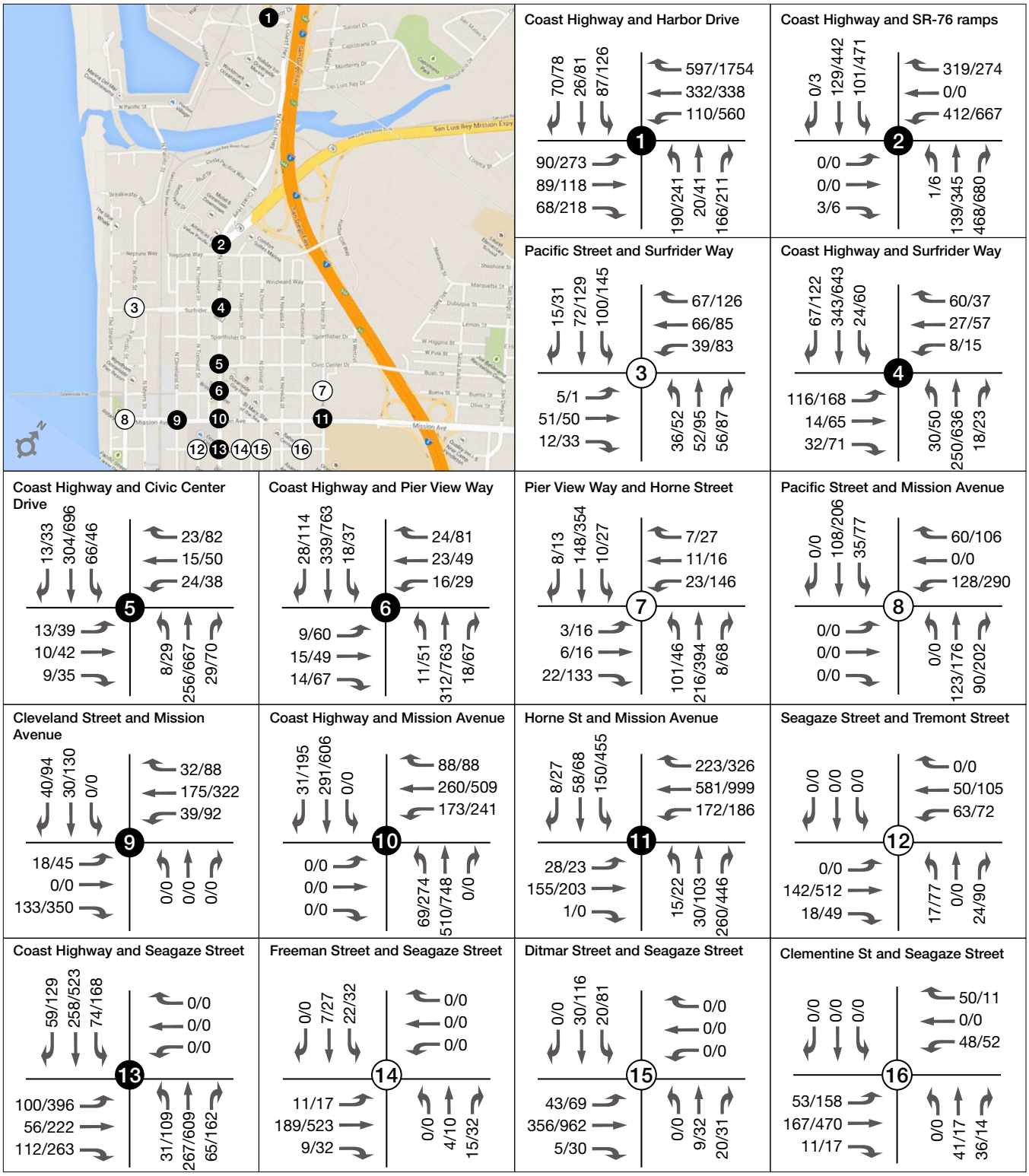
Eleven intersections were identified to operate below the minimum acceptable LOS D during the PM peak hour in the future baseline condition. The following intersections each would operate worse than LOS D for the PM period.

- Coast Highway and Harbor Drive / I-5 Ramps (#1)
- Wisconsin Avenue and Pacific Street (#19)

- Oceanside Boulevard and Tremont Street (#26)
- Morse Street and Freeman Street (#30)
- Cassidy Street and Broadway Street (#33)
- Cassidy Street - Freeman Street (#36)
- Coast Highway and Vista Way (#40)
- Vista Way and Freeman Street (#41)
- Vista Way and Ditmar Street (#42)
- Vista Way and Stewart Street (#43)
- Oceanside Boulevard and I-5 NB On-/Off-Ramp (#53)
- Vista Way and I-5 SB On/Off-Ramp (#56)

All other intersections would operate at LOS D or better during both peak hours.

Figure 5-1a Future (No Project) Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ##/## AM/PM Turning Movement Volume

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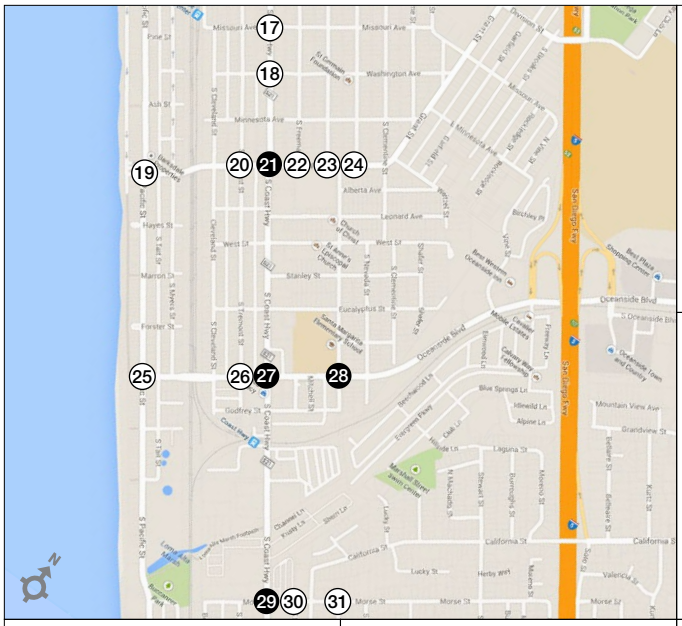
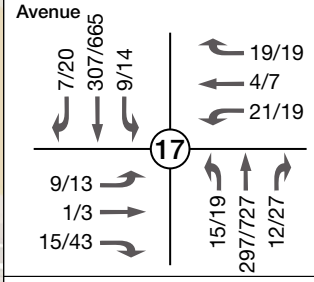
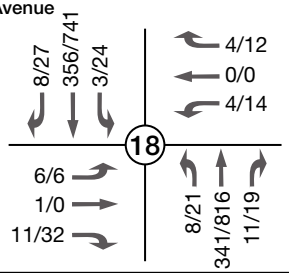
Figure 5-1b Future (No Project) Peak Hour Volumes - AM & PM



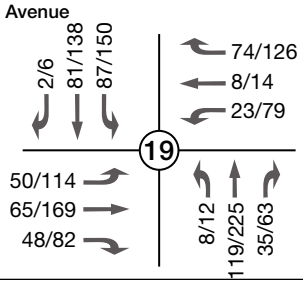
Coast Highway and Missouri Avenue



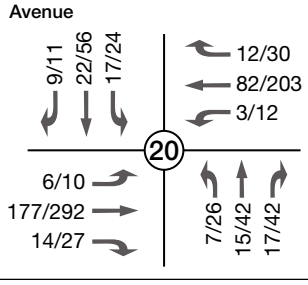
Coast Highway and Washington Avenue



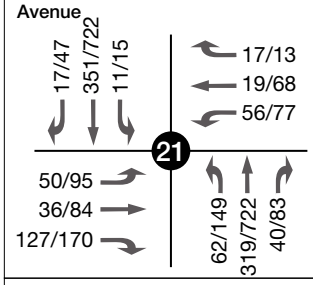
Pacific Street and Wisconsin Avenue



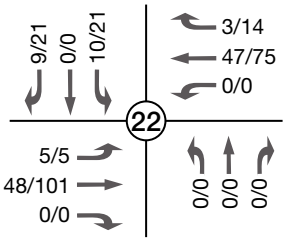
Tremont Street and Wisconsin Avenue



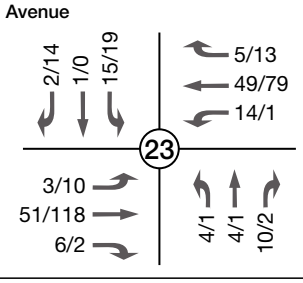
Coast Highway and Wisconsin Avenue



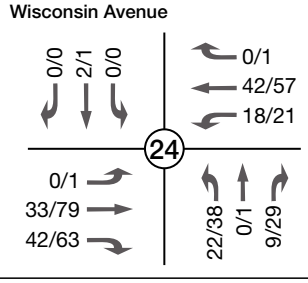
Freeman Street and Wisconsin Avenue



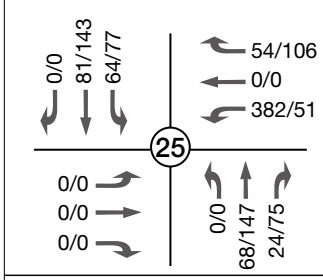
Ditmar Street (North) and Wisconsin Avenue



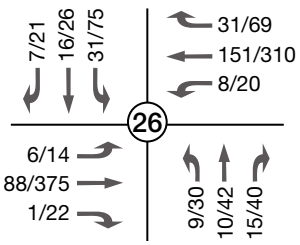
Ditmar Street (South) and Wisconsin Avenue



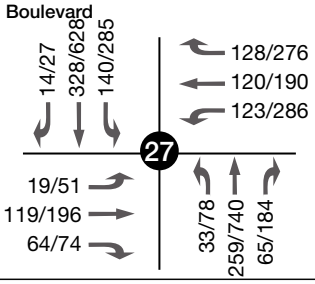
Pacific St and Oceanside Blvd



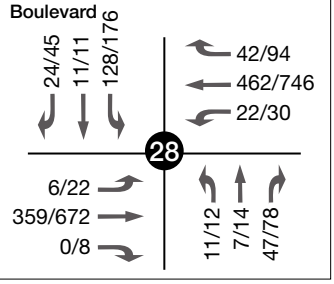
Tremont Street and Oceanside Boulevard



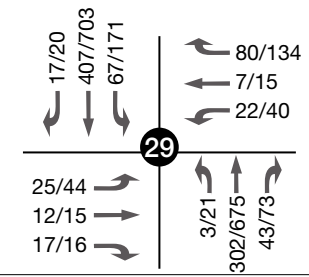
Coast Highway and Oceanside Boulevard



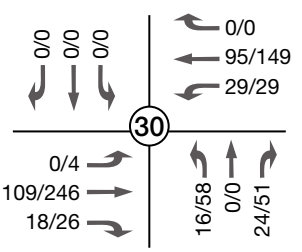
Ditmar Street and Oceanside Boulevard



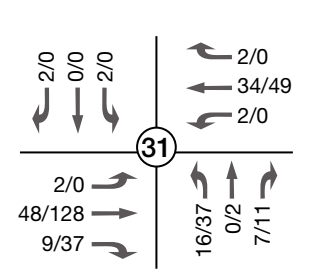
Coast Highway and Morse Street



Freeman St and Morse Street



Ditmar Street and Morse Street



Legend

● Signalized Intersections ○ Unsignalized Intersections ##/## AM/PM Turning Movement Volume

Figure 5-1c Future (No Project) Peak Hour Volumes - AM & PM

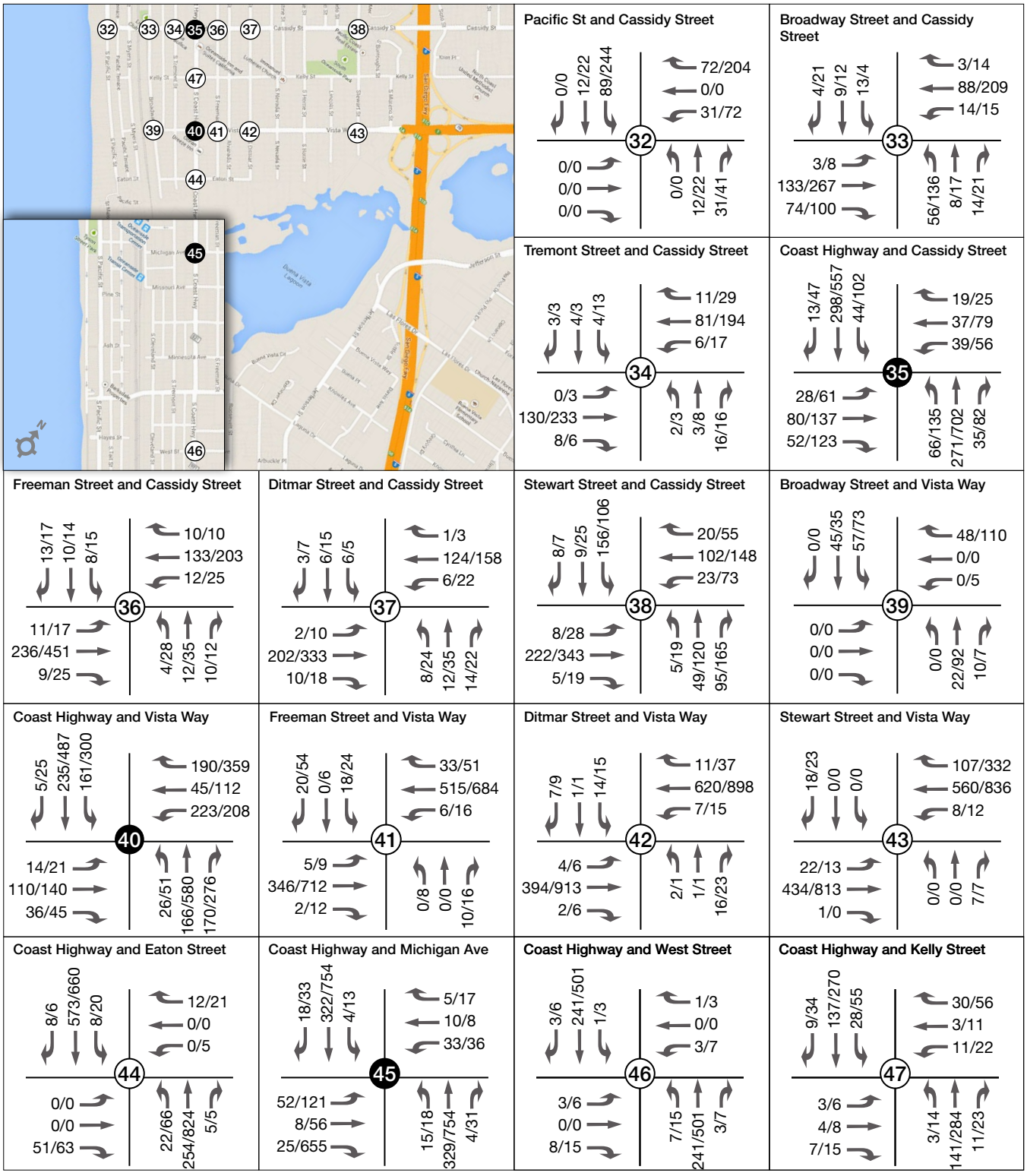
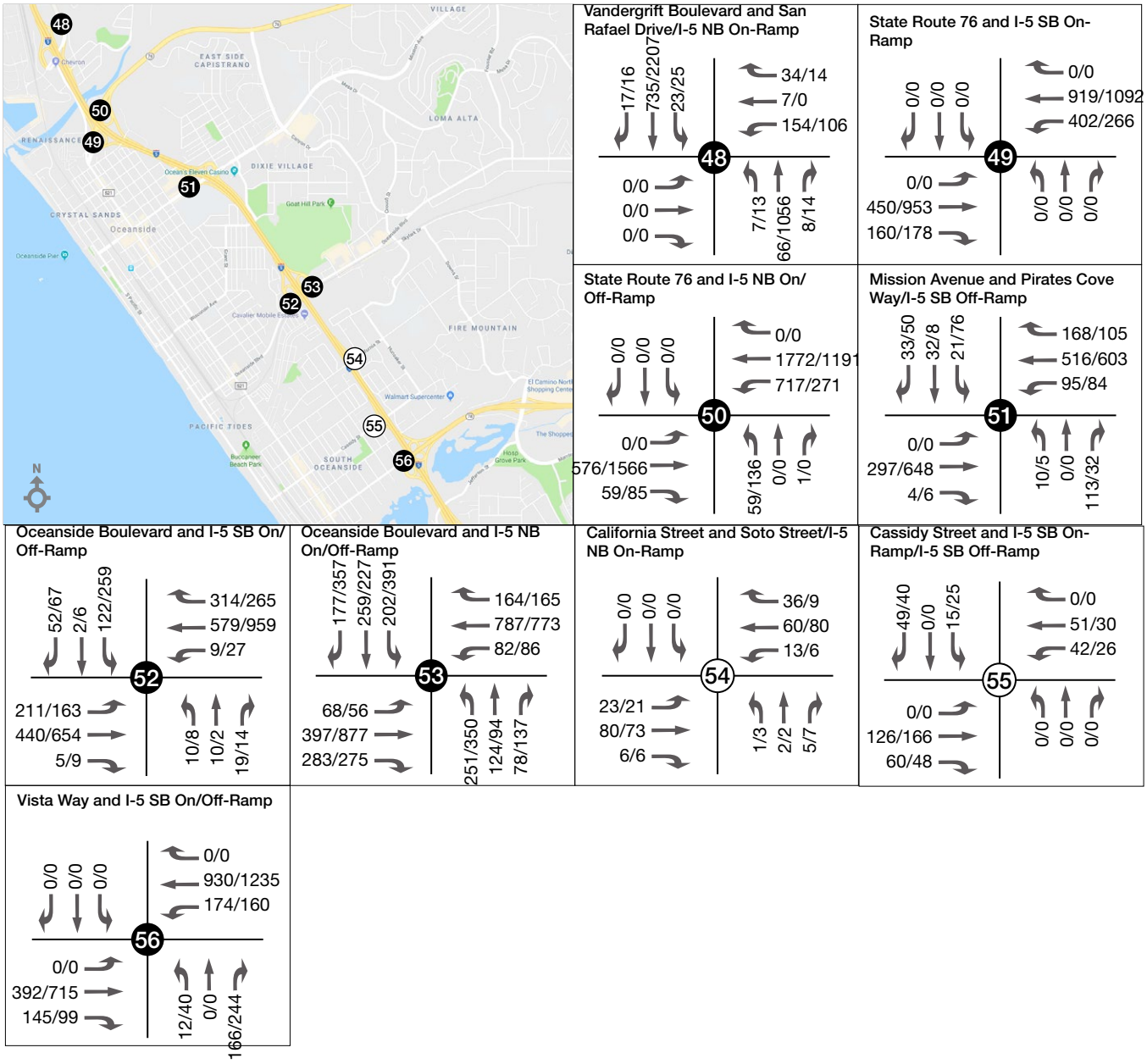


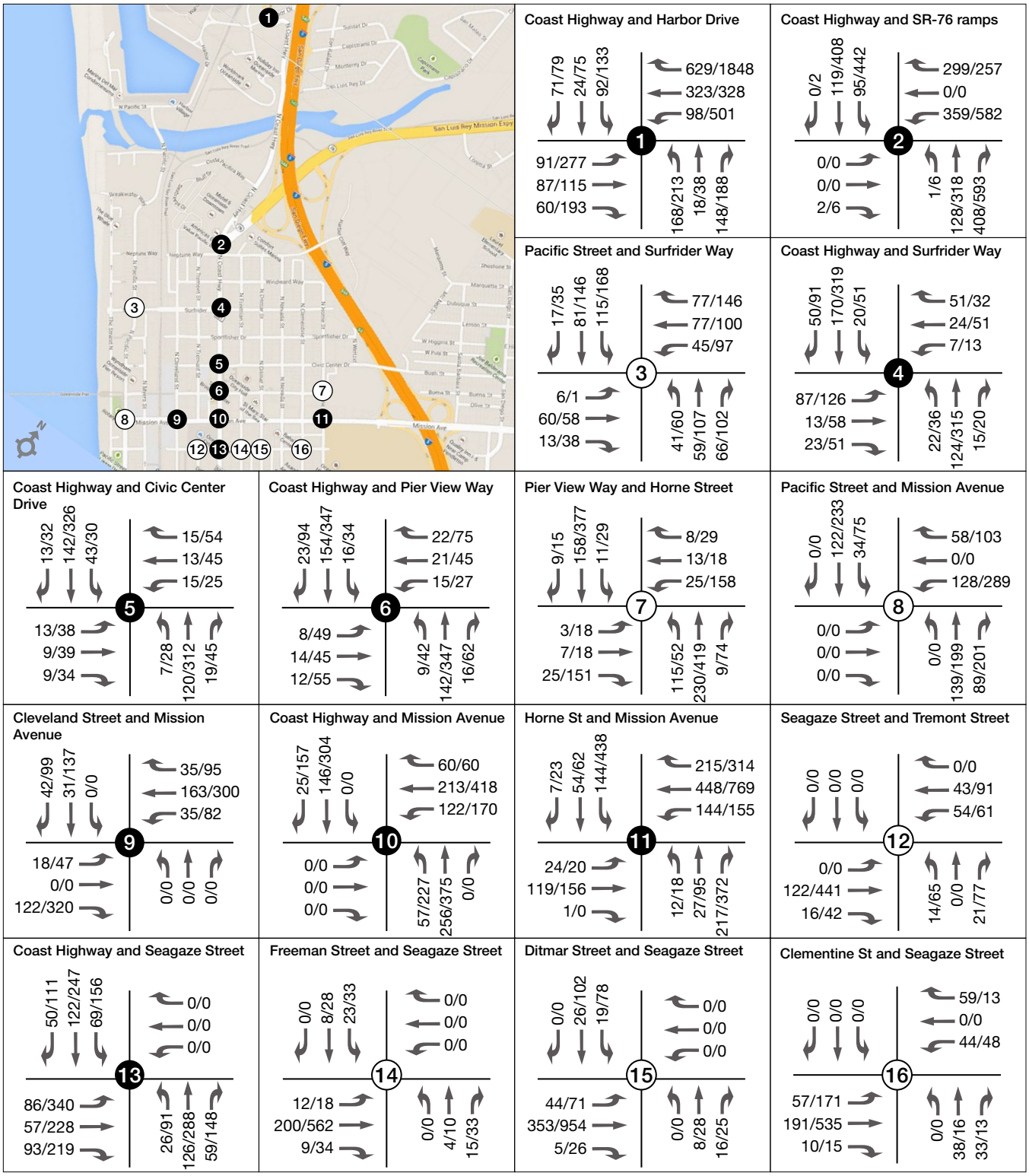
Figure 5-1d Future (No Project) Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ##/## AM/PM Turning Movement Volume

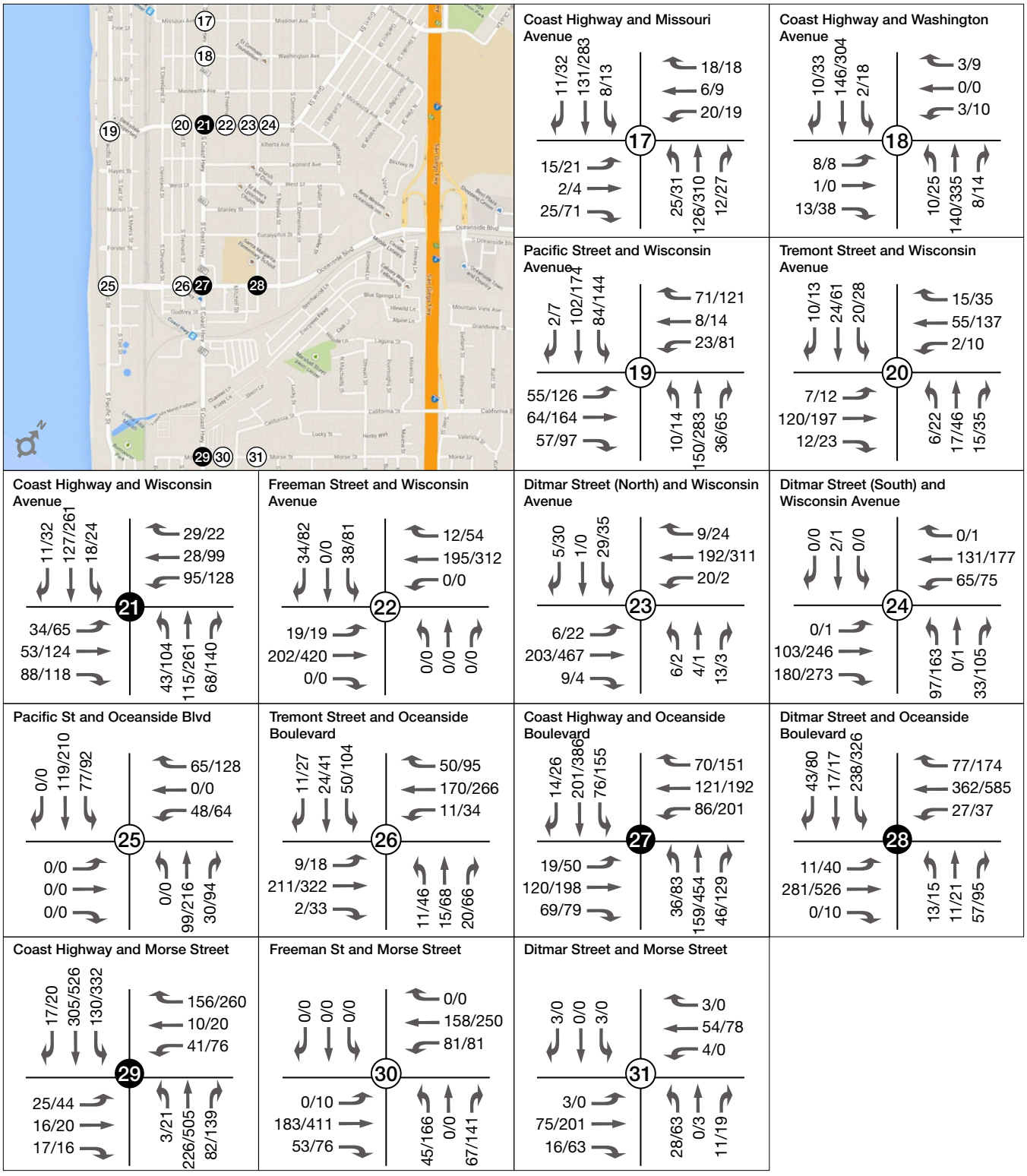
Figure 5-2a Future (No Project) Existing SR-78 Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ##/## AM/PM Turning Movement Volume

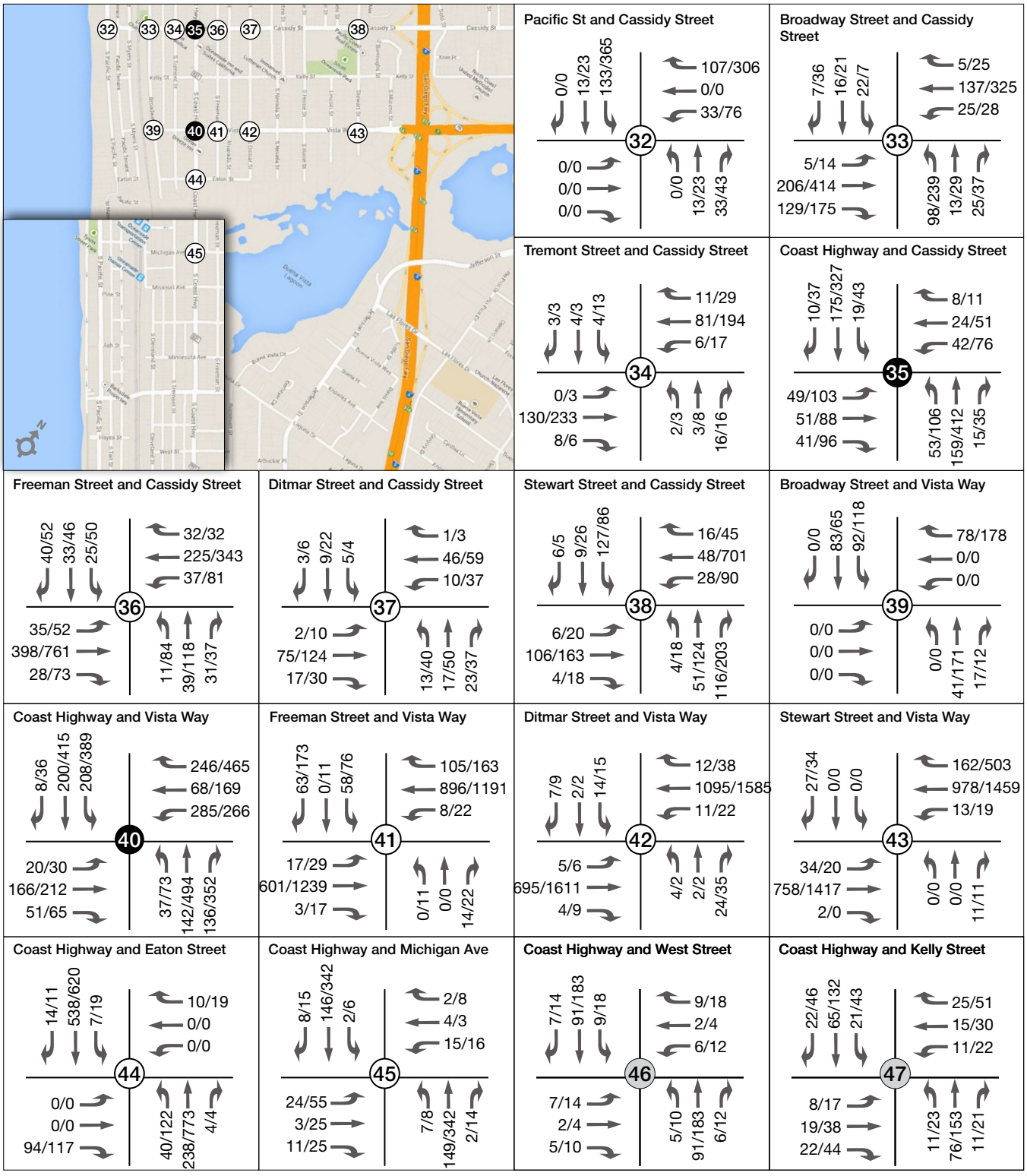
Figure 5-2b Future (No Project) Existing SR-78 Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ##/## AM/PM Turning Movement Volume

Figure 5-2c Future (No Project) Existing SR-78 Peak Hour Volumes - AM & PM

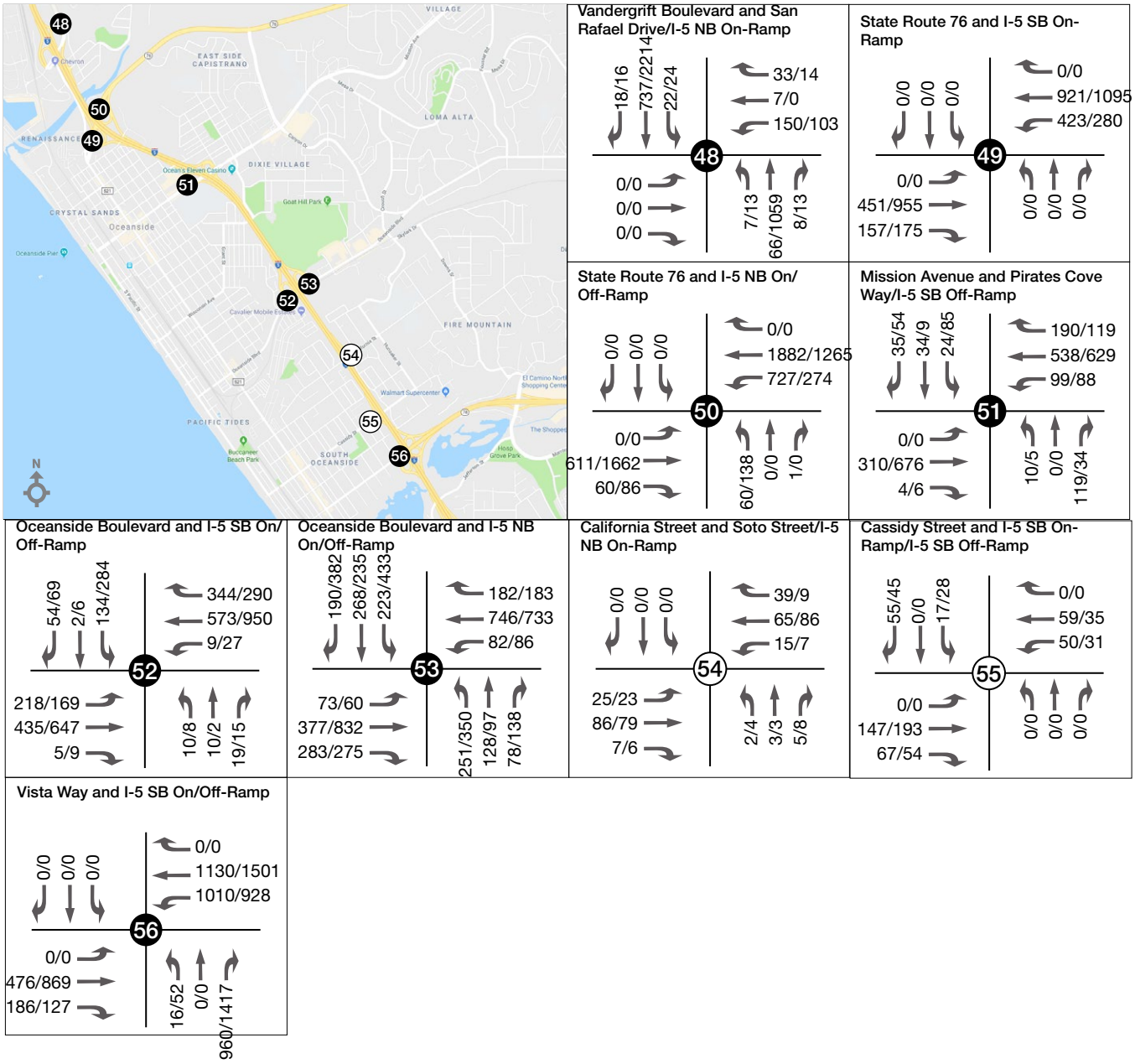


Legend

● Signalized Intersections ○ Unsignalized Intersections ##/## AM/PM Turning Movement Volume

OCEANSIDE COAST HIGHWAY CORRIDOR STUDY

Figure 5-2d Future (No Project) Existing SR-78 Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ##/## AM/PM Turning Movement Volume

5.2 Year 2035 Future Conditions with Project (Two-Lane Coast Highway) – Modified Vision Plan

This section examines traffic conditions with the Coast Highway Corridor Project which proposes 2 lanes throughout the corridor with 12 new roundabouts as described in section 3.6.2. The analysis was conducted for Future (2035) under the Modified Vision Plan conditions.

5.2.1 Road Segment Volumes

Road segment volumes have been included for noise modeling purposes. Future road segment volumes with project are found in Appendix A. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

5.2.2 Intersection Level of Service

This section examines traffic conditions with and without the Coast Highway Corridor project. The analysis was conducted for the future conditions.

The intersection operations analysis for the future condition with project was performed consistent with the methodology outlined in Section 3. Table 5-3 presents the results for the future conditions traffic analysis with project. A comparison between the future condition without and with project is also provided. Figure 5-3 contains the traffic volumes used for the future conditions with project analysis.

Table 5-3: LOS Analysis – Future Conditions with Project

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	30.4	C	Signalized	AM	29.8	C	No
			PM	**65.3**	**E**		PM	46.8	D	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	13.3	B	RBT	AM	3.9	A	No
			PM	27.7	C		PM	26.7	D	No
3	Surfrider Way - Pacific Street	AWSC	AM	9.7	A	AWSC	AM	9	A	No
			PM	14.5	B		PM	12.8	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	12.8	B	RBT	AM	8.8	A	No
			PM	15.6	B		PM	**83.4**	**F**	**Yes**
5	Coast Highway - Civic Center Drive	Signalized	AM	26.8	C	RBT	AM	7.4	A	No
			PM	14.6	B		PM	32	D	No
6	Coast Highway - Pier View Way	Signalized	AM	13.6	B	RBT	AM	6.6	A	No
			PM	12.5	B		PM	29.1	D	No
7	Pier View Way - Horne Street	AWSC	AM	9.2	A	AWSC	AM	8.8	A	No
			PM	15.6	C		PM	11.5	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	9.2	A	AWSC	AM	9	A	No
			PM	17.3	C		PM	16.8	C	No
9	Mission Avenue - Cleveland Street	Signalized	AM	30.4	C	Signalized	AM	14.8	B	No
			PM	18.5	B		PM	12.4	B	No
10	Coast Highway - Mission Avenue	Signalized	AM	10.6	B	Signalized	AM	16.4	B	No
			PM	14	B		PM	26.6	C	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
11	Mission Avenue - Horne Street	Signalized	AM	7.1	A	Signalized	AM	14.7	B	No
			PM	12.1	B		PM	13.5	B	No
12	Seagaze Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	9.2	A	No
			PM	22.2	C		PM	11.6	B	No
13	Coast Highway - Seagaze Street	Signalized	AM	18.7	B	Signalized	AM	12.5	B	No
			PM	23.9	C		PM	18	B	No
14	Seagaze Street - Freeman Street	SSSC	AM	10	B	SSSC	AM	10.1	B	No
			PM	14.4	B		PM	15.2	C	No
15	Seagaze Street - Ditmar Street	AWSC	AM	8.5	A	AWSC	AM	9	A	No
			PM	33.3	D		PM	**55.5**	**F**	**Yes**
16	Seagaze Street - Clementine Street	SSSC	AM	8.1	A	SSSC	AM	8.4	A	No
			PM	14.1	B		PM	16.6	C	No
17	Coast Highway - Missouri Avenue	SSSC	AM	13.1	B	SSSC	AM	10.1	B	No
			PM	33.7	D		PM	13.7	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	12.4	B	RBT	AM	5.9	A	No
			PM	31.9	D		PM	12.1	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	9.7	A	AWSC	AM	9	A	No
			PM	28.7	D		PM	15.7	C	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	11.5	B	SSSC	AM	12.5	B	No
			PM	18.4	C		PM	26.6	D	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	10.6	B	RBT	AM	8.3	A	No
			PM	19.3	B		PM	**49.2**	**E**	**Yes**
22	Wisconsin Avenue - Freeman Street	SSSC	AM	9	A	SSSC	AM	11.2	B	No
			PM	9.5	A		PM	15.8	C	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	9.6	A	SSSC	AM	13.4	B	No
			PM	9.8	A		PM	19.6	C	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	7.5	A	AWSC	AM	9.8	A	No
			PM	7.8	A		PM	24.2	C	No
25	Oceanside Boulevard - Pacific Street	AWSC	AM	8.4	A	AWSC	AM	8.4	A	No
			PM	9.8	A		PM	10.8	B	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	12.4	B	SSSC	AM	14	B	No
			PM	24.6	C		PM	**41.1**	**E**	**Yes**
27	Coast Highway - Oceanside Boulevard	Signalized	AM	16.4	B	RBT	AM	10.5	B	No
			PM	**58.5**	**E**		PM	**57.8**	**F**	**Yes**
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	19.1	B	Signalized	AM	15.8	B	No
			PM	8.1	A		PM	18	B	No
29	Coast Highway - Morse Street	Signalized	AM	16.4	B	RBT	AM	9.2	A	No
			PM	15.5	B		PM	**71.1**	**F**	**Yes**
30	Morse Street - Freeman Street	SSSC	AM	9.8	A	SSSC	AM	10.2	B	No
			PM	13.1	B		PM	14.9	B	No
31	Morse Street - Ditmar Street	SSSC	AM	9.1	A	SSSC	AM	9.2	A	No
			PM	10	B		PM	10.5	B	No
32	Cassidy Street - Pacific Street	AWSC	AM	8.1	A	AWSC	AM	7.9	A	No
			PM	11.1	B		PM	12	B	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
33	Cassidy Street - Broadway Street	SSSC	AM	11.5	B	SSSC	AM	10.9	B	No
			PM	23.8	C		PM	18.7	C	No
34	Cassidy Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	9.8	A	No
			PM	13.1	B		PM	11.7	B	No
35	Coast Highway - Cassidy Street	Signalized	AM	15.5	B	RBT	AM	11.4	B	No
			PM	19.6	B		PM	**249.9**	**F**	**Yes**
36	Cassidy Street - Freeman Street	SSSC	AM	11.7	B	SSSC	AM	10.4	B	No
			PM	21.2	C		PM	17.1	C	No
37	Cassidy Street - Ditmar Street	AWSC	AM	8.7	A	AWSC	AM	7.2	A	No
			PM	11.6	B		PM	7.6	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	11	B	AWSC	AM	8.5	A	No
			PM	24.5	C		PM	10.5	B	No
39	Vista Way - Broadway Street	SSSC	AM	7.8	A	SSSC	AM	7.8	A	No
			PM	8.2	A		PM	8.2	A	No
40	Coast Highway - Vista Way	Signalized	AM	25	C	Signalized	AM	31.1	C	No
			PM	45.1	D		PM	**64.2**	**E**	**Yes**
41	Vista Way - Freeman Street	SSSC	AM	13.5	B	SSSC	AM	14.7	B	No
			PM	20	C		PM	27.6	D	No
42	Vista Way - Ditmar Street	SSSC	AM	14.8	B	SSSC	AM	19.9	C	No
			PM	25	D		PM	**585.5**	**F**	**Yes**
43	Vista Way - Stewart Street	SSSC	AM	13.2	B	SSSC	AM	17.5	C	No
			PM	20.2	C		PM	**35.3**	**E**	**Yes**
44	Coast Highway - Eaton Street	SSSC	AM	14.4	B	SSSC	AM	14.4	B	No
			PM	16.2	C		PM	23.3	C	No
45	Coast Highway - Michigan Avenue	Signalized	AM	7.5	A	RBT	AM	6.5	A	No
			PM	6.6	A		PM	21.3	C	No
46	Coast Highway - West Street	SSSC	AM	11.4	B	RBT	AM	4.7	A	No
			PM	18	C		PM	6.9	A	No
47	Coast Highway - Kelly Street	SSSC	AM	10.2	B	RBT	AM	4.7	A	No
			PM	13.9	B		PM	8.6	A	No
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	15	B	Signalized	AM	16.6	B	No
			PM	36.6	D		PM	45.6	D	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	4.8	A	Signalized	AM	5.0	A	No
			PM	4.5	A		PM	4.8	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	21.5	C	Signalized	AM	27.0	C	No
			PM	22.4	C		PM	31.6	C	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	11.5	B	Signalized	AM	11.3	B	No
			PM	13.5	B		PM	13.3	B	No
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	AM	**43.5**	**D**	Signalized	AM	**74.5**	**E**	Yes
			PM	**42.4**	**D**		PM	**51.1**	**D**	Yes
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	**39.8**	**D**	Signalized	AM	**38.7**	**D**	No
			PM	**65.3**	**E**		PM	**71.9**	**E**	Yes
54	California - I-5 NB On-Ramp	AWSC	AM	7.6	A	AWSC	AM	7.7	A	No
			PM	7.5	A		PM	7.6	A	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	9.2	A	SSSC	AM	9.3	A	No
			PM	9.3	A		PM	9.5	A	No
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	20.4	C	Signalized	AM	32.7	C	No
			PM	25.7	C		PM	**89.9**	**F**	**Yes**

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. OVF – Overflow, Synchro is unable to calculate a level of delay
F. RBT – Roundabout
G. The minimum acceptable LOS is "D" for intersections 1-47
H. The minimum acceptable LOS is "D"; a change from C or D to a lower LOS will cause an impact for intersections 48-56

The following intersections are identified to generate significant impacts in the future with project conditions:

- Coast Highway & Surfrider Way (#4)
- Seagaze Street & Ditmar Street (#15)
- Coast Highway & Wisconsin Boulevard (#21)
- Oceanside Boulevard & Tremont Street (#26)
- Coast Highway & Oceanside Boulevard (#27)
- Coast Highway & Morse Street (#29)
- Coast Highway & Cassidy Street (#35)
- Coast Highway & Vista Way (#40)
- Vista Way & Ditmar Street (#42)
- Vista Way & Stewart Street (#43)
- Oceanside Boulevard and I-5 SB On-/Off-Ramp (#52)
- Oceanside Boulevard and I-5 NB On-/Off-Ramp (#53)
- Vista Way & I-5 SB On/Off Ramp (#56)

All other intersections are not impacted by the proposed project.

Mitigation measures are discussed in Section 7.

5.2.3 Vista Way/SR-78 & I-5 Existing Configuration

This section examines traffic conditions with the Coast Highway Corridor project which includes 2 lanes throughout the corridor and assumes existing network conditions for the Vista Way/SR-78 and I-5 Interchange. The analysis was conducted for future (2035) conditions.

5.2.3.1 Road Segment Volumes

Road segment volumes have been included in Appendix A for use in noise modeling purposes. Future road segment volumes are extracted from SANDAG's regional model. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

5.2.3.2 Intersection Level of Service

The intersection operations analysis for the future condition without project was performed consistent with the methodology outlined in Section 3. Table 5-4 presents the results for the future conditions traffic analysis with the proposed project under existing Vista Way/SR-78 & I-5 Interchange configuration. Figure 5-4 contains the traffic volumes used for the future condition analysis.

Table 5-4: LOS Analysis – Future Conditions with Project (Existing SR-78)

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	31.1	C	Signalized	AM	29.8	C	No
			PM	**68.9**	**E**		PM	53.7	D	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	12.7	B	RBT	AM	3	A	No
			PM	25.6	C		PM	17.8	C	No
3	Surfrider Way - Pacific Street	AWSC	AM	10.4	B	AWSC	AM	9.7	A	No
			PM	19.5	C		PM	14.6	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	16.4	B	RBT	AM	5.8	A	No
			PM	17.1	B		PM	**71**	**F**	**Yes**
5	Coast Highway - Civic Center Drive	Signalized	AM	13.2	B	RBT	AM	7.3	A	No
			PM	15.6	B		PM	30.6	D	No
6	Coast Highway - Pier View Way	Signalized	AM	19.2	B	RBT	AM	7.1	A	No
			PM	8.7	A		PM	**46.4**	**E**	**Yes**
7	Pier View Way - Horne Street	AWSC	AM	9.4	A	AWSC	AM	8.9	A	No
			PM	17.6	C		PM	11.9	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	9.5	A	AWSC	AM	9.3	A	No
			PM	19.4	C		PM	17.6	C	No
9	Mission Avenue - Cleveland Street	Signalized	AM	18.8	B	Signalized	AM	13	B	No
			PM	17.7	B		PM	14.8	B	No
10	Coast Highway - Mission Avenue	Signalized	AM	12	B	Signalized	AM	15.2	B	No
			PM	12.8	B		PM	30.6	C	No
11	Mission Avenue - Horne Street	Signalized	AM	6.9	A	Signalized	AM	13.3	B	No
			PM	10.7	B		PM	12.8	B	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
12	Seagaze Street - Tremont Street	SSSC	AM	9.8	A	SSSC	AM	9.1	A	No
			PM	17.1	C		PM	11.2	B	No
13	Coast Highway - Seagaze Street	Signalized	AM	15.8	B	Signalized	AM	13.1	B	No
			PM	22.7	C		PM	16.7	B	No
14	Seagaze Street - Freeman Street	SSSC	AM	10.1	B	SSSC	AM	10	B	No
			PM	15	B		PM	14.4	B	No
15	Seagaze Street - Ditmar Street	AWSC	AM	8.6	A	AWSC	AM	8.7	A	No
			PM	30.2	D		PM	**38**	**E**	**Yes**
16	Seagaze Street - Clementine Street	SSSC	AM	8.3	A	SSSC	AM	8.2	A	No
			PM	17.7	C		PM	14.3	B	No
17	Coast Highway - Missouri Avenue	SSSC	AM	10.8	B	SSSC	AM	10	A	No
			PM	15.7	C		PM	13.3	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	9.9	A	RBT	AM	5.9	A	No
			PM	13.8	B		PM	12.9	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	10.1	B	AWSC	AM	9.7	A	No
			PM	**51.3**	**F**		PM	20.4	C	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	10.8	B	SSSC	AM	12.7	B	No
			PM	14.9	B		PM	30.8	D	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	14.5	B	RBT	AM	8.5	A	No
			PM	24.5	C		PM	**57.8**	**F**	**Yes**
22	Wisconsin Avenue - Freeman Street	SSSC	AM	11.5	B	SSSC	AM	10.9	B	No
			PM	19.4	C		PM	14.9	B	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	13.2	B	SSSC	AM	13.1	B	No
			PM	17.9	C		PM	17.9	C	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	9.5	A	AWSC	AM	9.7	A	No
			PM	23.7	C		PM	26.5	D	No
25	Oceanside Boulevard - Pacific Street	AWSC	AM	9.1	A	AWSC	AM	9.2	A	No
			PM	12.1	B		PM	12.6	B	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	14.3	B	SSSC	AM	13.9	B	No
			PM	**91**	**F**		PM	**42.1**	**E**	No
27	Coast Highway - Oceanside Boulevard	Signalized	AM	26.2	C	RBT	AM	11.2	B	No
			PM	32.1	C		PM	**254**	**F**	**Yes**
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	14.9	B	Signalized	AM	15.3	B	No
			PM	15.3	B		PM	16.5	B	No
29	Coast Highway - Morse Street	Signalized	AM	19.6	B	RBT	AM	10.8	B	No
			PM	22.9	C		PM	**134.8**	**F**	**Yes**
30	Morse Street - Freeman Street	SSSC	AM	12.9	B	SSSC	AM	10.5	B	No
			PM	**112.9**	**F**		PM	16.8	C	No
31	Morse Street - Ditmar Street	SSSC	AM	9.5	A	SSSC	AM	9.3	A	No
			PM	11.5	B		PM	10.9	B	No
32	Cassidy Street - Pacific Street	AWSC	AM	8.6	A	AWSC	AM	8.6	A	No
			PM	16.8	C		PM	17	C	No
33	Cassidy Street - Broadway Street	SSSC	AM	16	C	SSSC	AM	11.6	B	No
			PM	**397.4**	**F**		PM	26.5	D	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
34	Cassidy Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	10.3	B	No
			PM	13.1	B		PM	12.7	B	No
35	Coast Highway - Cassidy Street	Signalized	AM	18.5	B	RBT	AM	9.4	A	No
			PM	20	C		PM	**166.3**	**F**	**Yes**
36	Cassidy Street - Freeman Street	SSSC	AM	21.4	C	SSSC	AM	11	B	No
			PM	**OVF**	**F**		PM	26.1	D	No
37	Cassidy Street - Ditmar Street	AWSC	AM	7.6	A	AWSC	AM	7.5	A	No
			PM	8.6	A		PM	8.5	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	9.2	A	AWSC	AM	8.9	A	No
			PM	13.8	B		PM	12.4	B	No
39	Vista Way - Broadway Street	SSSC	AM	8.5	A	SSSC	AM	8	A	No
			PM	9.4	A		PM	8.4	A	No
40	Coast Highway - Vista Way	Signalized	AM	32.8	C	Signalized	AM	35.5	D	No
			PM	**78.9**	**E**		PM	**66.3**	**E**	No
41	Vista Way - Freeman Street	SSSC	AM	34	D	SSSC	AM	16.8	C	No
			PM	**OVF**	**F**		PM	**49.4**	**E**	No
42	Vista Way - Ditmar Street	SSSC	AM	26.2	D	SSSC	AM	25.2	D	No
			PM	**294.2**	**F**		PM	**OVF**	**F**	**Yes**
43	Vista Way - Stewart Street	SSSC	AM	22	C	SSSC	AM	22.1	C	No
			PM	**69.1**	**F**		PM	**66.8**	**F**	No
44	Coast Highway - Eaton Street	SSSC	AM	14.9	B	SSSC	AM	16.3	C	No
			PM	17.4	C		PM	33.5	D	No
45	Coast Highway - Michigan Avenue	Signalized	AM	4.7	A	RBT	AM	6.4	A	No
			PM	5.4	A		PM	19.4	C	No
46	Coast Highway - West Street	SSSC	AM	9.6	A	RBT	AM	4.9	A	No
			PM	11.2	B		PM	7.3	A	No
47	Coast Highway - Kelly Street	SSSC	AM	10	B	RBT	AM	5.6	A	No
			PM	12.7	B		PM	10.2	B	No
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	15	B	Signalized	AM	16.6	B	No
			PM	37.4	D		PM	45.6	D	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	4.9	A	Signalized	AM	5	A	No
			PM	4.5	A		PM	4.8	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	25.4	C	Signalized	AM	27	C	No
			PM	27.8	C		PM	31.6	C	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	11.6	B	Signalized	AM	11.3	B	No
			PM	13.8	B		PM	13.3	B	No
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	AM	**50.2**	**D**	Signalized	AM	**74.5**	**E**	**Yes**
			PM	**42.6**	**D**		PM	**51.1**	**D**	**Yes**
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	**37.7**	**D**	Signalized	AM	**38.7**	**D**	Yes
			PM	**65.7**	**E**		PM	**71.9**	**E**	Yes
54	California - I-5 NB On-Ramp	AWSC	AM	7.6	A	AWSC	AM	7.7	A	No
			PM	7.6	A		PM	7.6	A	No
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	9.3	A	SSSC	AM	9.3	A	No
			PM	9.5	A		PM	9.5	A	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	25.8	C	Signalized	AM	32.7	C	No
			PM	**88**	**F**		PM	**89.9**	**F**	**Yes**

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. OVF – Overflow, Synchro is unable to calculate a level of delay
F. RBT – Roundabout
G. The minimum acceptable LOS is "D" for intersections 1-47
H. The minimum acceptable LOS is "D"; a change from C or D to a lower LOS will cause an impact for intersections 48-56

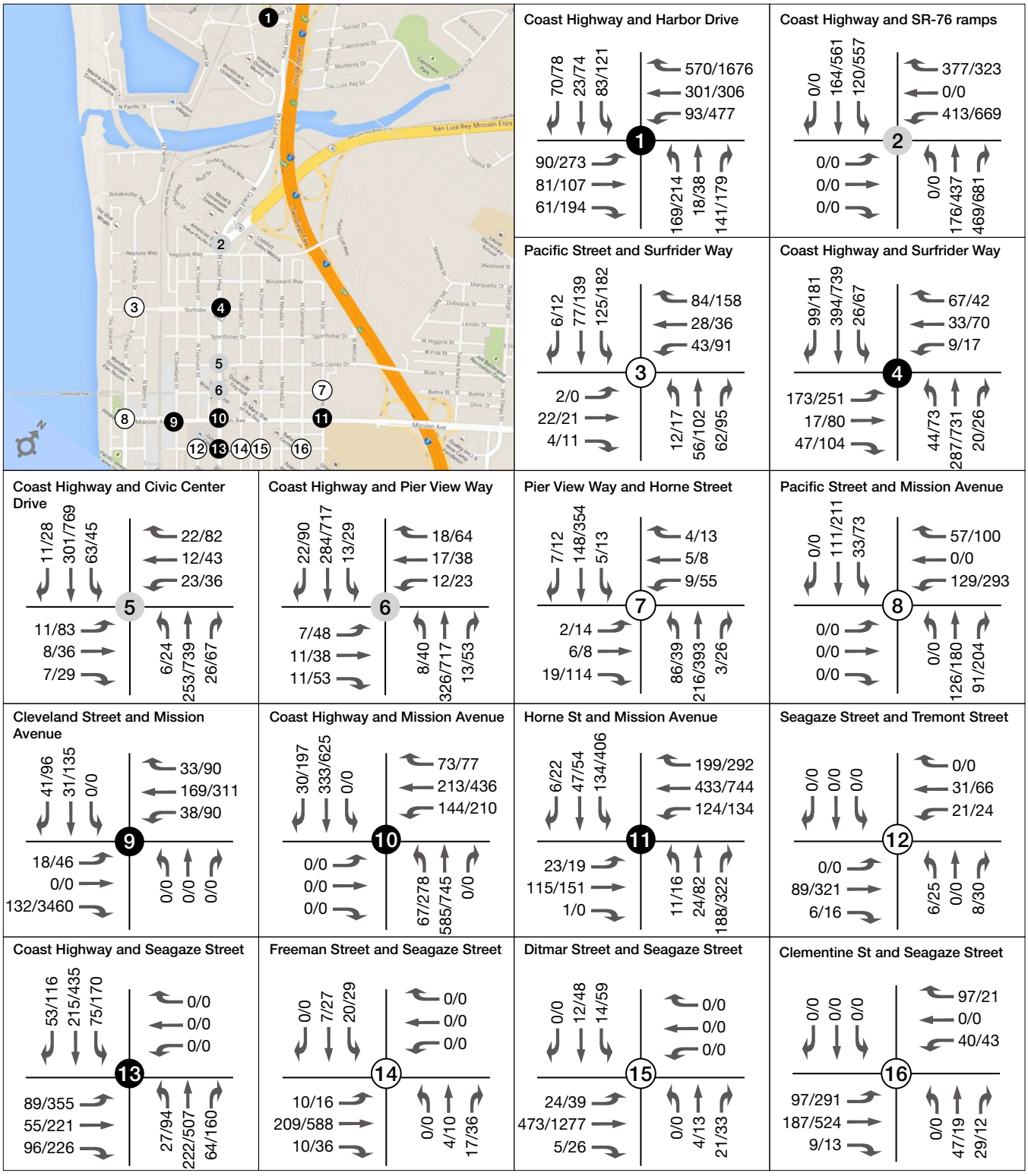
The following intersections are identified to generate significant impacts in the PM peak hour in the future with project conditions:

- Coast Highway & Surfrider Way (#4)
- Coast Highway & Pier View Way (#6)
- Seagaze Street & Ditmar Street (#15)
- Coast Highway & Wisconsin Boulevard (#21)
- Coast Highway & Oceanside Boulevard (#27)
- Coast Highway & Morse Street (#29)
- Coast Highway & Cassidy Street (#35)
- Vista Way & Ditmar Street (#42)
- Oceanside Boulevard & I-5 SB On/Off-Ramp (#52)
- Oceanside Boulevard & I-5 NB On/Off-Ramp (#53)
- Vista Way & I-5 SB On/Off Ramp (#56)

All other intersections are not impacted by the proposed project.

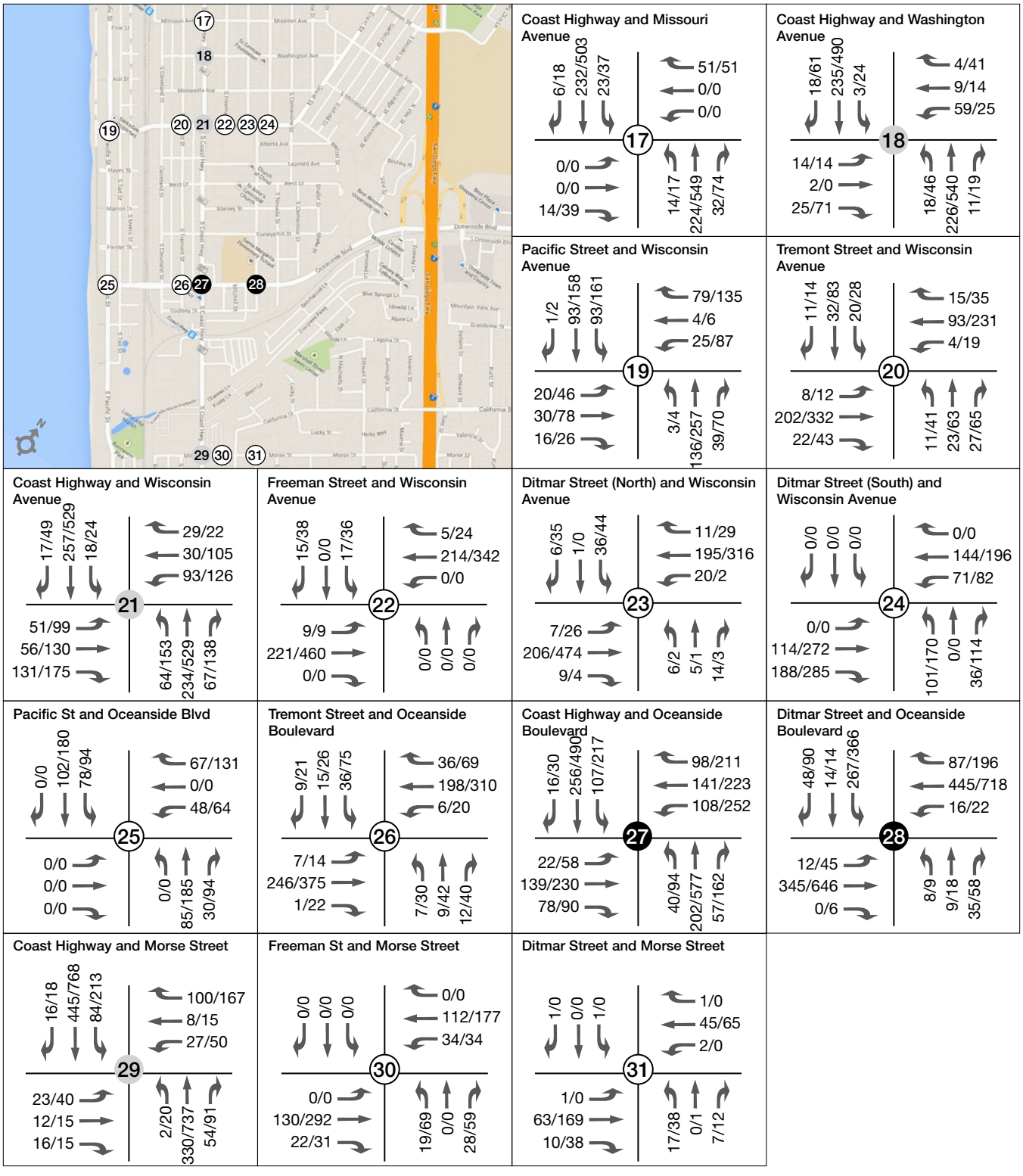
Mitigation measures are discussed in Section 7.

Figure 5-3a Future with Project Peak Hour Volumes - AM & PM



OCEANSIDE
COAST HIGHWAY
CORRIDOR STUDY

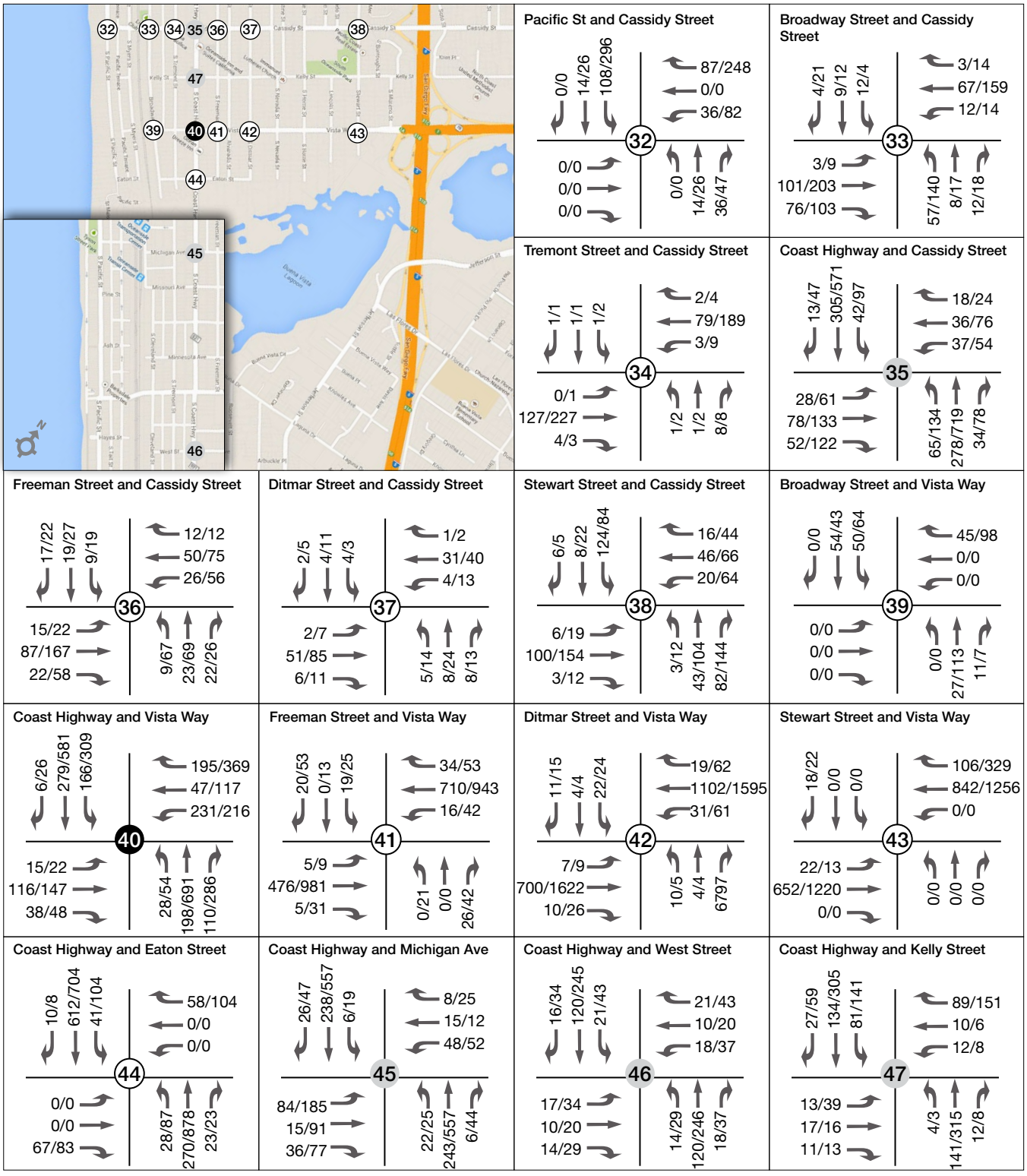
Figure 5-3b Future with Project Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

Figure 5-3c Future with Project Peak Hour Volumes - AM & PM



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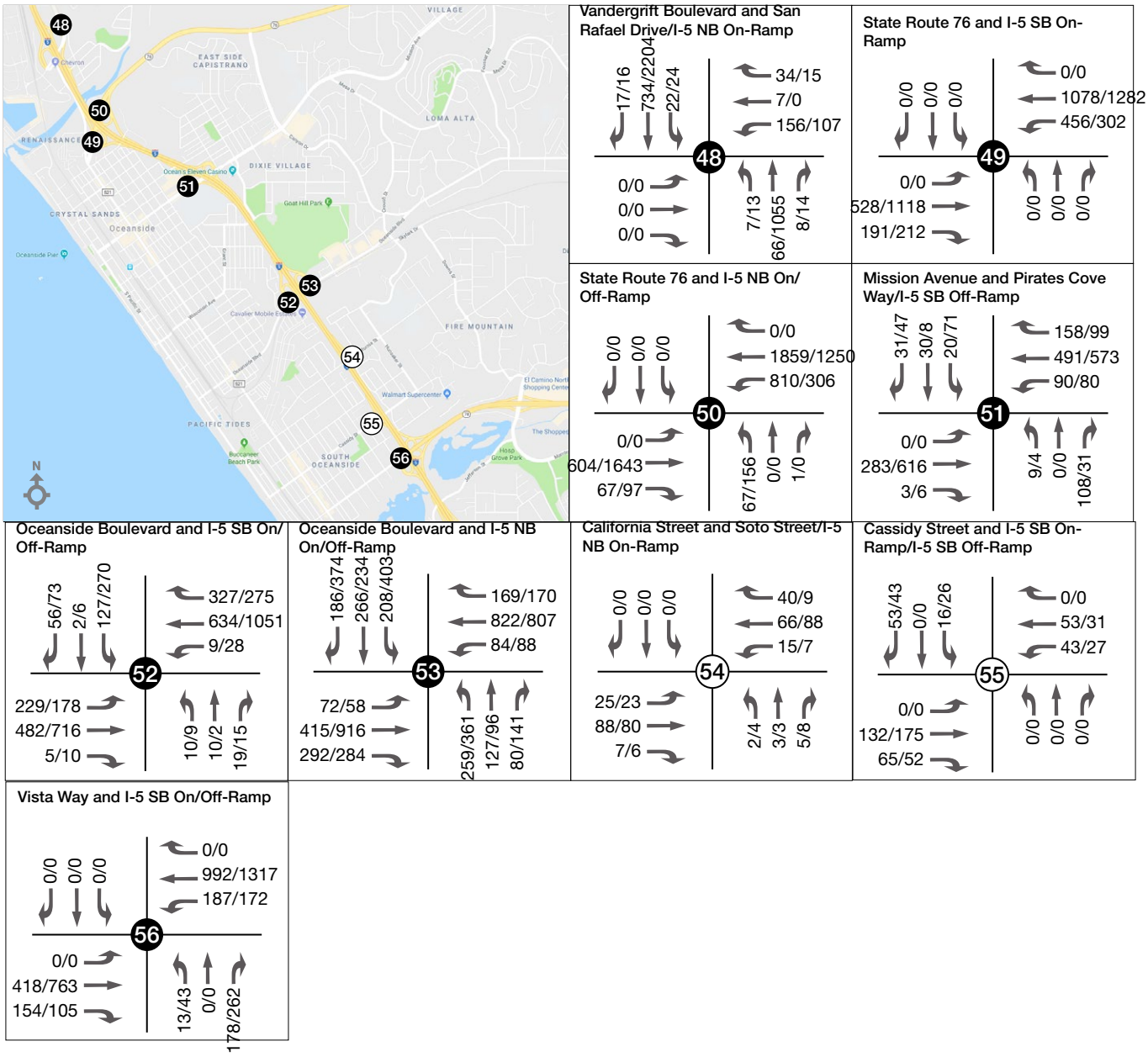
CORRIDOR STUDY

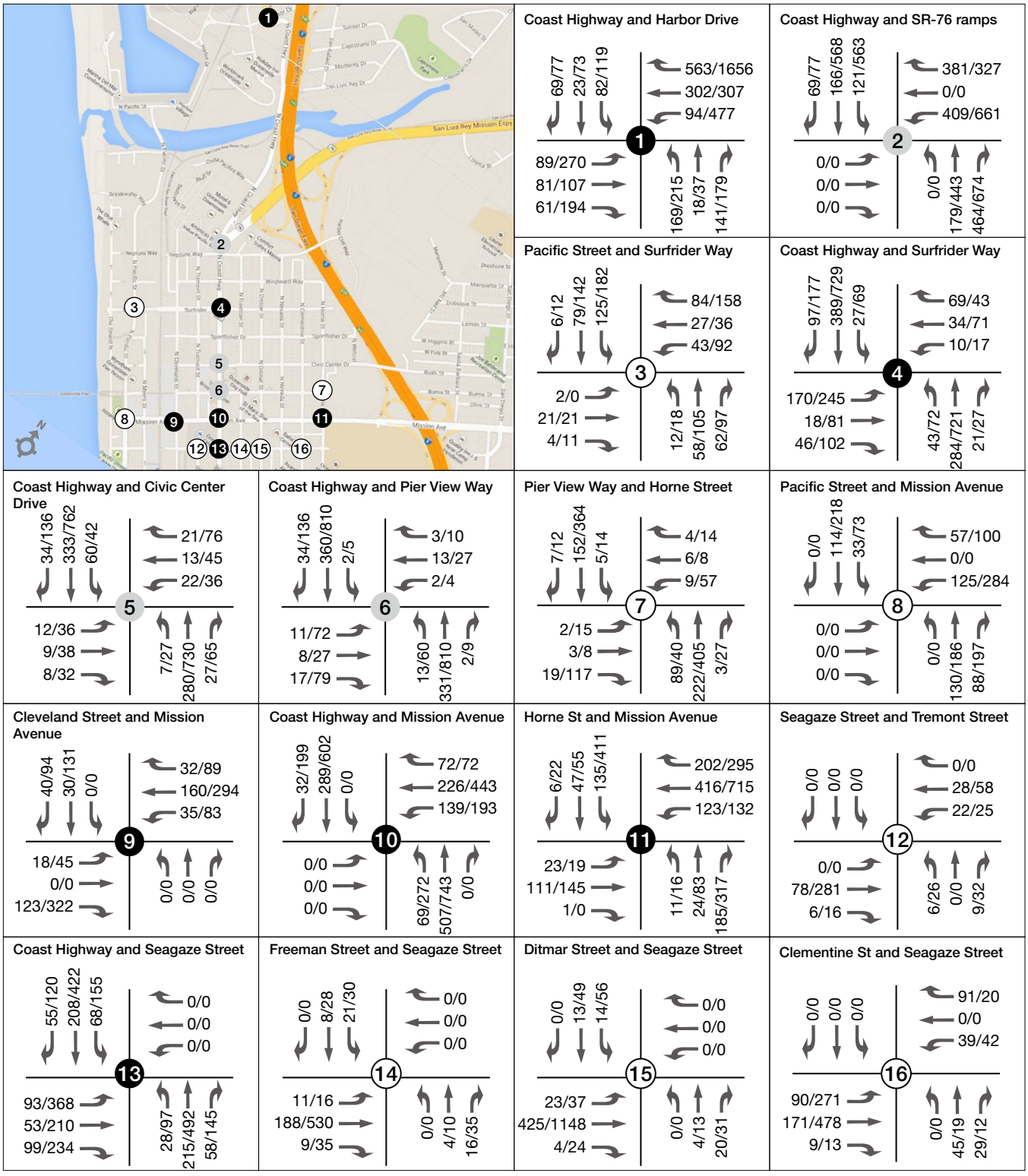
Figure 5-3d Future with Project Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

Figure 5-4a Future with Project (Existing SR-78) Peak Hour Volumes - AM & PM



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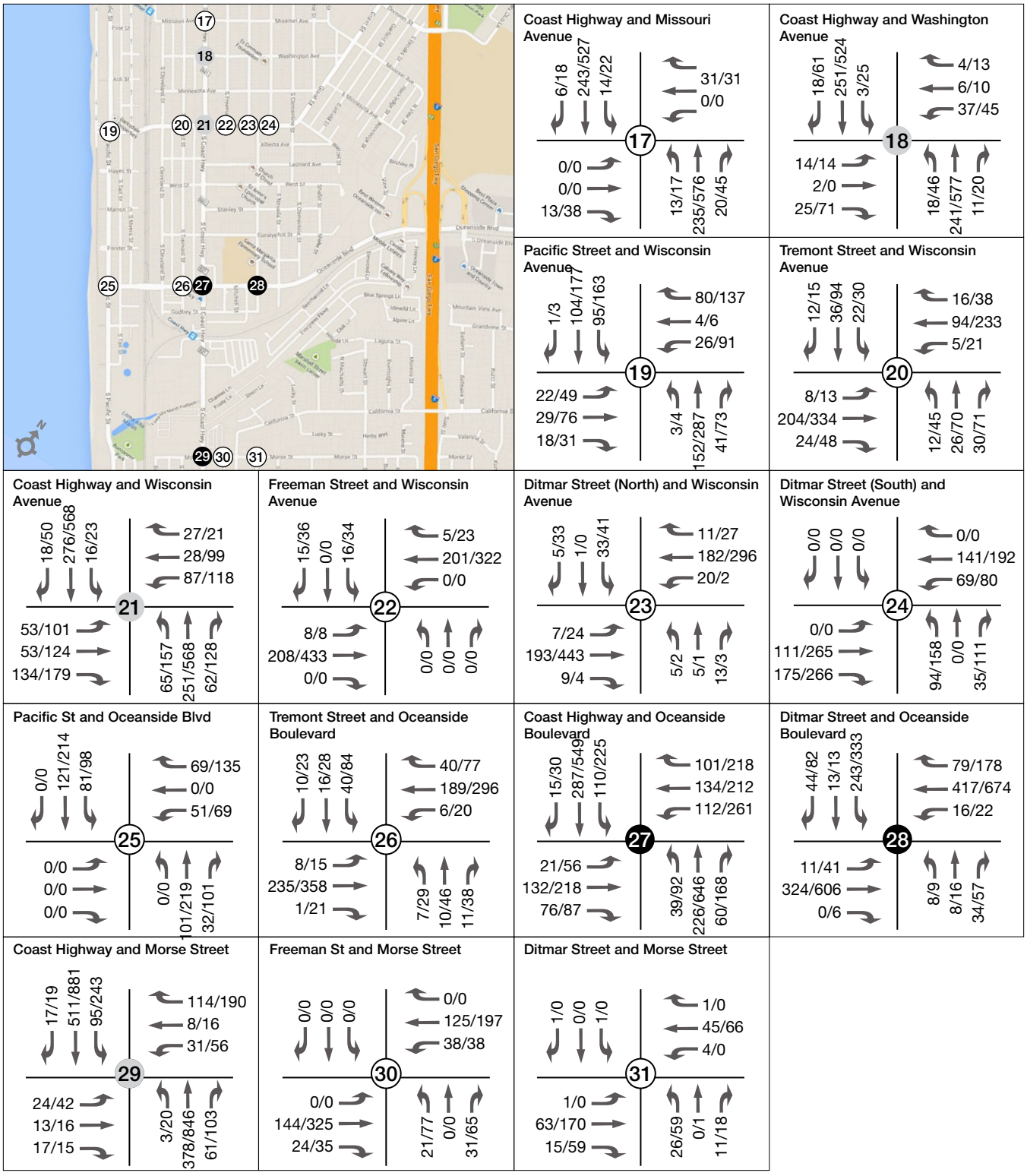
COAST HIGHWAY
CORRIDOR STUDY

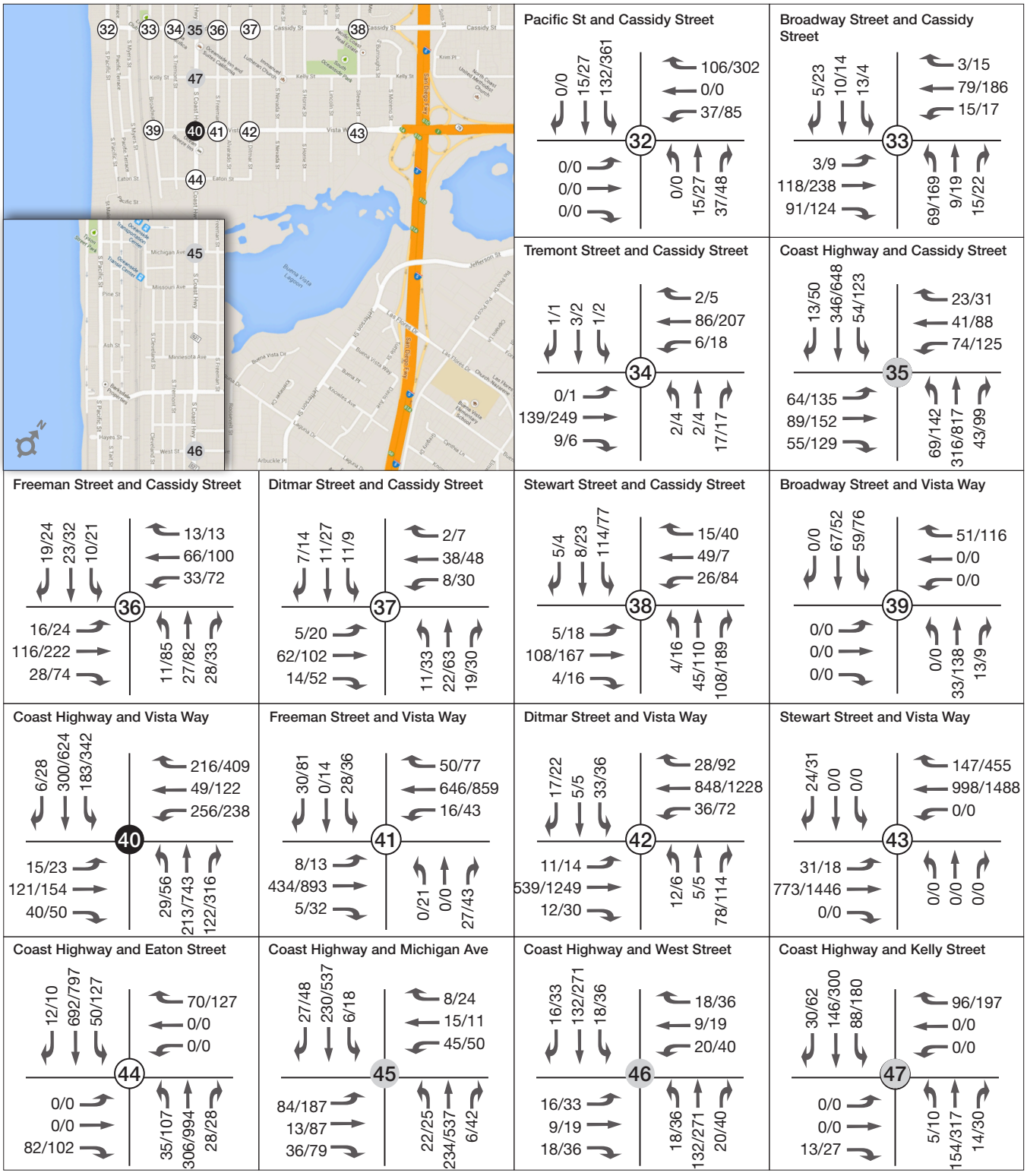
Figure 5-4b Future with Project (Existing SR-78) Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ● Roundabout Intersections ##/## AM/PM Turning Movement Volume

Figure 5-4c Future with Project (Existing SR-78) Peak Hour Volumes - AM & PM

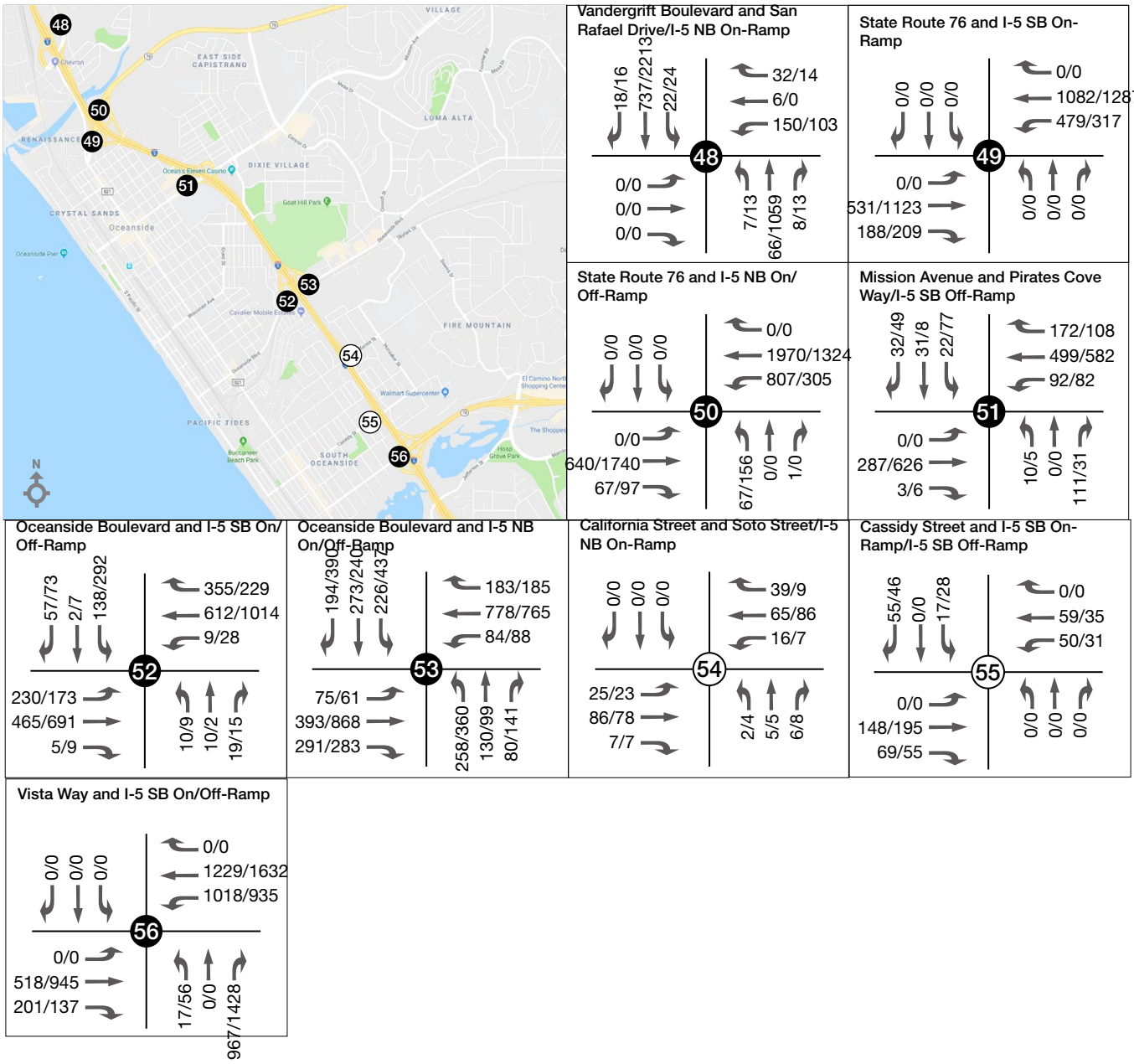


Legend

Signalized Intersections Unsignalized Intersections Roundabout Intersections ##/## AM/PM Turning Movement Volume

OCEANSIDE
COAST HIGHWAY
CORRIDOR STUDY

Figure 5-4d Future with Project (Existing SR-78) Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

5.3 Year 2035 Future Conditions with Project Alternative 1 (Four-Lanes between Oceanside Blvd and Vista Way) – Modified Vision Plan

This section examines traffic conditions with the Coast Highway Corridor project alternative 1 which proposes 2 lanes from Harbor Drive to Oceanside Blvd and four lanes between Oceanside Blvd and Vista Way with seven new roundabouts as described in section 3.6.3. The analysis was conducted for the future (2035) conditions.

5.3.1 Road Segment Volumes

Road segment volumes have been included for noise modeling purposes. Future road segment volumes with project alternative 1 are found in Appendix A. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

5.3.2 Intersection Level of Service

This section examines traffic conditions with and without the Coast Highway Corridor Project Alternative 1. The analysis was conducted for the future conditions.

The intersection operations analysis for the future condition with project alternative 1 was performed consistent with the methodology outlined in Section 3. Table 5-5 presents the results for the future conditions traffic analysis with project alternative 1. A comparison between the future condition without and with project alternative 1 is also provided. Figure 5-5 contains the traffic volumes used for the future conditions with project alternative 1 analysis.

Table 5-5: LOS Analysis – Future Conditions with Project Alternative 1

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	30.4	C	Signalized	AM	29.8	C	No
			PM	**65.3**	**E**		PM	46.8	D	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	13.3	B	RBT	AM	3.9	A	No
			PM	27.7	C		PM	26.7	D	No
3	Surfrider Way - Pacific Street	AWSC	AM	9.7	A	AWSC	AM	9	A	No
			PM	14.5	B		PM	12.8	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	12.8	B	Signalized	AM	12.9	B	No
			PM	15.6	B		PM	19.2	B	No
5	Coast Highway - Civic Center Drive	Signalized	AM	26.8	C	RBT	AM	7.4	A	No
			PM	14.6	B		PM	32	D	No
6	Coast Highway - Pier View Way	Signalized	AM	13.6	B	RBT	AM	6.6	A	No
			PM	12.5	B		PM	29.1	D	No
7	Pier View Way - Horne Street	AWSC	AM	9.2	A	AWSC	AM	8.8	A	No
			PM	15.6	C		PM	11.5	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	9.2	A	AWSC	AM	9	A	No
			PM	17.3	C		PM	16.8	C	No
9	Mission Avenue - Cleveland Street	Signalized	AM	30.4	C	Signalized	AM	14.8	B	No
			PM	18.5	B		PM	12.4	B	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
10	Coast Highway - Mission Avenue	Signalized	AM	10.6	B	Signalized	AM	16.4	B	No
			PM	14	B		PM	26.6	C	No
11	Mission Avenue - Horne Street	Signalized	AM	7.1	A	Signalized	AM	14.7	B	No
			PM	12.1	B		PM	13.5	B	No
12	Seagaze Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	9.2	A	No
			PM	22.2	C		PM	11.6	B	No
13	Coast Highway - Seagaze Street	Signalized	AM	18.7	B	Signalized	AM	12.5	B	No
			PM	23.9	C		PM	18	B	No
14	Seagaze Street - Freeman Street	SSSC	AM	10	B	SSSC	AM	10.1	B	No
			PM	14.4	B		PM	15.2	C	No
15	Seagaze Street - Ditmar Street	AWSC	AM	8.5	A	AWSC	AM	9	A	No
			PM	33.3	D		PM	**55.5**	**F**	**Yes**
16	Seagaze Street - Clementine Street	SSSC	AM	8.1	A	SSSC	AM	8.3	A	No
			PM	14.1	B		PM	16.6	C	No
17	Coast Highway - Missouri Avenue	SSSC	AM	13.1	B	SSSC	AM	10.1	B	No
			PM	33.7	D		PM	13.7	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	12.4	B	RBT	AM	5.8	A	No
			PM	31.9	D		PM	11.7	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	9.7	A	AWSC	AM	9	A	No
			PM	28.7	D		PM	15.7	C	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	11.5	B	SSSC	AM	12.5	B	No
			PM	18.4	C		PM	26.6	D	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	10.6	B	RBT	AM	8.3	A	No
			PM	19.3	B		PM	**49.2**	**E**	**Yes**
22	Wisconsin Avenue - Freeman Street	SSSC	AM	9	A	SSSC	AM	11.2	B	No
			PM	9.5	A		PM	15.8	C	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	9.6	A	SSSC	AM	13.4	B	No
			PM	9.8	A		PM	19.6	C	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	7.5	A	AWSC	AM	9.8	A	No
			PM	7.8	A		PM	24.2	C	No
25	Oceanside Boulevard - Pacific Street	AWSC	AM	8.4	A	AWSC	AM	8.4	A	No
			PM	9.8	A		PM	10.8	B	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	12.4	B	SSSC	AM	14	B	No
			PM	24.6	C		PM	**41.1**	**E**	**Yes**
27	Coast Highway - Oceanside Boulevard	Signalized	AM	16.4	B	Signalized	AM	27	C	No
			PM	**58.5**	**E**		PM	45	D	No
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	19.1	B	Signalized	AM	15.8	B	No
			PM	8.1	A		PM	18	B	No
29	Coast Highway - Morse Street	Signalized	AM	16.4	B	Signalized	AM	8.5	A	No
			PM	15.5	B		PM	14	B	No
30	Morse Street - Freeman Street	SSSC	AM	9.8	A	SSSC	AM	10.2	B	No
			PM	13.1	B		PM	14.9	B	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
31	Morse Street - Ditmar Street	SSSC	AM	9.1	A	SSSC	AM	9.2	A	No
			PM	10	B		PM	10.5	B	No
32	Cassidy Street - Pacific Street	AWSC	AM	8.1	A	AWSC	AM	7.9	A	No
			PM	11.1	B		PM	12	B	No
33	Cassidy Street - Broadway Street	SSSC	AM	11.5	B	SSSC	AM	10.9	B	No
			PM	23.8	C		PM	18.7	C	No
34	Cassidy Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	9.8	A	No
			PM	13.1	B		PM	11.7	B	No
35	Coast Highway - Cassidy Street	Signalized	AM	15.5	B	Signalized	AM	14.2	B	No
			PM	19.6	B		PM	51.1	D	No
36	Cassidy Street - Freeman Street	SSSC	AM	11.7	B	SSSC	AM	10.4	B	No
			PM	21.2	C		PM	17.1	C	No
37	Cassidy Street - Ditmar Street	AWSC	AM	8.7	A	AWSC	AM	7.2	A	No
			PM	11.6	B		PM	7.6	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	11	B	AWSC	AM	8.5	A	No
			PM	24.5	C		PM	10.5	B	No
39	Vista Way - Broadway Street	SSSC	AM	7.8	A	SSSC	AM	7.8	A	No
			PM	8.2	A		PM	8.2	A	No
40	Coast Highway - Vista Way	Signalized	AM	25	C	Signalized	AM	32	C	No
			PM	45.1	D		PM	50.7	D	No
41	Vista Way - Freeman Street	SSSC	AM	13.5	B	SSSC	AM	14.7	B	No
			PM	20	C		PM	27.5	D	No
42	Vista Way - Ditmar Street	SSSC	AM	14.8	B	SSSC	AM	19.9	C	No
			PM	25	D		PM	**472.7**	**F**	**Yes**
43	Vista Way - Stewart Street	SSSC	AM	13.2	B	SSSC	AM	17.5	C	No
			PM	20.2	C		PM	**35.3**	**E**	**Yes**
44	Coast Highway - Eaton Street	SSSC	AM	14.4	B	SSSC	AM	16	C	No
			PM	16.2	C		PM	19.2	C	No
45	Coast Highway - Michigan Avenue	Signalized	AM	7.5	A	RBT	AM	6.4	A	No
			PM	6.6	A		PM	20.1	C	No
46	Coast Highway - West Street	SSSC	AM	11.4	B	RBT	AM	4.7	A	No
			PM	18	C		PM	6.9	A	No
47	Coast Highway - Kelly Street	SSSC	AM	10.2	B	SSSC	AM	13.3	B	No
			PM	13.9	B		PM	33.9	D	No
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	15	B	Signalized	AM	16.6	B	No
			PM	36.6	D		PM	45.6	D	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	4.8	A	Signalized	AM	5.0	A	No
			PM	4.5	A		PM	4.8	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	21.5	C	Signalized	AM	27.0	C	No
			PM	22.4	C		PM	31.6	C	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	11.5	B	Signalized	AM	11.3	B	No
			PM	13.5	B		PM	13.3	B	No
52		Signalized	AM	**43.5**	**D**	Signalized	AM	**75.9**	**E**	Yes

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
	Oceanside - I-5 SB On/Off-Ramp		PM	**42.4**	**D**		PM	**51.1**	**D**	Yes
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	**39.8**	**D**	Signalized	AM	**40.0**	**D**	Yes
			PM	**65.3**	**E**		PM	**71.9**	**E**	Yes
54	California - I-5 NB On-Ramp	AWSC	AM	7.6	A	AWSC	AM	7.7	A	No
			PM	7.5	A		PM	7.6	A	No
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	9.2	A	SSSC	AM	9.3	A	No
			PM	9.3	A		PM	9.5	A	No
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	20.4	C	Signalized	AM	32.7	C	No
			PM	25.7	C		PM	**89.9**	**F**	**Yes**

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. OVF – Overflow, Synchro is unable to calculate a level of delay
F. RBT – Roundabout
G. The minimum acceptable LOS is “D” for intersections 1-47
H. The minimum acceptable LOS is “D”; a change from C or D to a lower LOS will cause an impact for intersections 48-56

The following intersections are identified to generate significant impacts in the PM peak hour in the future with project conditions:

- Seagaze Street & Ditmar Street (#15)
- Coast Highway & Wisconsin Boulevard (#21)
- Oceanside Boulevard & Tremont Street (#26)
- Vista Way & Ditmar Street (#42)
- Vista Way & Stewart Street (#43)
- Oceanside Boulevard & I-5 SB On/Off-Ramp (#52)
- Oceanside Boulevard & I-5 NB On/Off-Ramp (#53)
- Vista Way & I-5 SB On/Off Ramp (#56)

All other intersections are not impacted by the proposed project alternative 1.

Mitigation measures are discussed in Section 7.

5.3.3 Vista Way/SR-78 & I-5 Existing Configuration

This section examines traffic conditions with the Coast Highway Corridor project alternative 1 throughout the corridor and assumes existing network conditions for the Vista Way/SR-78 and I-5 Interchange. The analysis was conducted for future (2035) conditions.

5.3.3.1 Road Segment Volumes

Road segment volumes have been included in Appendix A for use in noise modeling purposes. Future road segment volumes are extracted from SANDAG's regional model. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

5.3.3.2 Intersection Level of Service

The intersection operations analysis for the future condition without project was performed consistent with the methodology outlined in Section 3. Table 5-6 presents the results for the future conditions traffic analysis with the proposed project Alternative 1 under existing Vista Way/SR-78 & I-5 Interchange configuration. Figure 5-6 contains the traffic volumes used for the future condition analysis.

Table 5-6: LOS Analysis – Future Conditions with Project Alternative 1 (Existing SR-78)

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	31.1	C	Signalized	AM	29.8	C	No
			PM	**68.9**	**E**		PM	53.7	D	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	12.7	B	RBT	AM	3	A	No
			PM	25.6	C		PM	17.8	C	No
3	Surfrider Way - Pacific Street	AWSC	AM	10.4	B	AWSC	AM	9.7	A	No
			PM	19.5	C		PM	14.6	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	16.4	B	Signalized	AM	9.8	A	No
			PM	17.1	B		PM	18	B	No
5	Coast Highway - Civic Center Drive	Signalized	AM	13.2	B	RBT	AM	7.3	A	No
			PM	15.6	B		PM	30.6	D	No
6	Coast Highway - Pier View Way	Signalized	AM	19.2	B	RBT	AM	7.1	A	No
			PM	8.7	A		PM	**46.4**	**E**	**Yes**
7	Pier View Way - Horne Street	AWSC	AM	9.4	A	AWSC	AM	8.9	A	No
			PM	17.6	C		PM	11.9	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	9.5	A	AWSC	AM	9.3	A	No
			PM	19.4	C		PM	17.6	C	No
9	Mission Avenue - Cleveland Street	Signalized	AM	18.8	B	Signalized	AM	14.8	B	No
			PM	17.7	B		PM	16.8	B	No
10	Coast Highway - Mission Avenue	Signalized	AM	12	B	Signalized	AM	15.2	B	No
			PM	12.8	B		PM	30.6	C	No
11	Mission Avenue - Horne Street	Signalized	AM	6.9	A	Signalized	AM	13.3	B	No
			PM	10.7	B		PM	12.8	B	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
12	Seagaze Street - Tremont Street	SSSC	AM	9.8	A	SSSC	AM	9.1	A	No
			PM	17.1	C		PM	11.2	B	No
13	Coast Highway - Seagaze Street	Signalized	AM	15.8	B	Signalized	AM	13.1	B	No
			PM	22.7	C		PM	16.7	B	No
14	Seagaze Street - Freeman Street	SSSC	AM	10.1	B	SSSC	AM	10	B	No
			PM	15	B		PM	14.4	B	No
15	Seagaze Street - Ditmar Street	AWSC	AM	8.6	A	AWSC	AM	8.7	A	No
			PM	30.2	D		PM	**38**	**E**	**Yes**
16	Seagaze Street - Clementine Street	SSSC	AM	8.3	A	SSSC	AM	8.2	A	No
			PM	17.7	C		PM	14.3	B	No
17	Coast Highway - Missouri Avenue	SSSC	AM	10.8	B	SSSC	AM	10	A	No
			PM	15.7	C		PM	13.3	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	9.9	A	RBT	AM	5.9	A	No
			PM	13.8	B		PM	12.9	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	10.1	B	AWSC	AM	9.7	A	No
			PM	**51.3**	**F**		PM	20.4	C	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	10.8	B	SSSC	AM	12.7	B	No
			PM	14.9	B		PM	30.8	D	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	14.5	B	RBT	AM	8.5	A	No
			PM	24.5	C		PM	**57.8**	**F**	**Yes**
22	Wisconsin Avenue - Freeman Street	SSSC	AM	11.5	B	SSSC	AM	10.9	B	No
			PM	19.4	C		PM	14.9	B	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	13.2	B	SSSC	AM	13.1	B	No
			PM	17.9	C		PM	17.9	C	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	9.5	A	AWSC	AM	9.7	A	No
			PM	23.7	C		PM	26.5	D	No
25	Oceanside Boulevard - Pacific Street	AWSC	AM	9.1	A	AWSC	AM	9.2	A	No
			PM	12.1	B		PM	12.6	B	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	14.3	B	SSSC	AM	13.8	B	No
			PM	**91**	**F**		PM	**42**	**E**	No
27	Coast Highway - Oceanside Boulevard	Signalized	AM	26.2	C	Signalized	AM	26.7	C	No
			PM	32.1	C		PM	47.4	D	No
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	14.9	B	Signalized	AM	15.3	B	No
			PM	15.3	B		PM	15.6	B	No
29	Coast Highway - Morse Street	Signalized	AM	19.6	B	Signalized	AM	9.4	A	No
			PM	22.9	C		PM	15	B	No
30	Morse Street - Freeman Street	SSSC	AM	12.9	B	SSSC	AM	10.5	B	No
			PM	**112.9**	**F**		PM	16.8	C	No
31	Morse Street - Ditmar Street	SSSC	AM	9.5	A	SSSC	AM	9.3	A	No
			PM	11.5	B		PM	10.9	B	No
32	Cassidy Street - Pacific Street	AWSC	AM	8.6	A	AWSC	AM	8.6	A	No
			PM	16.8	C		PM	17	C	No
33	Cassidy Street - Broadway Street	SSSC	AM	16	C	SSSC	AM	11.6	B	No
			PM	**397.4**	**F**		PM	26.5	D	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
34	Cassidy Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	10.3	B	No
			PM	13.1	B		PM	12.7	B	No
35	Coast Highway - Cassidy Street	Signalized	AM	18.5	B	Signalized	AM	12.8	B	No
			PM	20	C		PM	31.5	C	No
36	Cassidy Street - Freeman Street	SSSC	AM	21.4	C	SSSC	AM	11	B	No
			PM	**OVF**	**F**		PM	26.1	D	No
37	Cassidy Street - Ditmar Street	AWSC	AM	7.6	A	AWSC	AM	7.5	A	No
			PM	8.6	A		PM	8.5	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	9.2	A	AWSC	AM	8.9	A	No
			PM	13.8	B		PM	12.4	B	No
39	Vista Way - Broadway Street	SSSC	AM	8.5	A	SSSC	AM	8	A	No
			PM	9.4	A		PM	8.4	A	No
40	Coast Highway - Vista Way	Signalized	AM	32.8	C	Signalized	AM	35.3	D	No
			PM	**78.9**	**E**		PM	54.9	D	No
41	Vista Way - Freeman Street	SSSC	AM	34	D	SSSC	AM	16.8	C	No
			PM	**OVF**	**F**		PM	**49.4**	**E**	No
42	Vista Way - Ditmar Street	SSSC	AM	26.2	D	SSSC	AM	25.2	D	No
			PM	**294.2**	**F**		**PM**	**OVF**	**F**	**Yes**
43	Vista Way - Stewart Street	SSSC	AM	22	C	SSSC	AM	22.1	C	No
			PM	**69.1**	**F**		**PM**	**66.8**	**F**	No
44	Coast Highway - Eaton Street	SSSC	AM	14.9	B	SSSC	AM	18.8	C	No
			PM	17.4	C		PM	24.5	C	No
45	Coast Highway - Michigan Avenue	Signalized	AM	4.7	A	RBT	AM	6.4	A	No
			PM	5.4	A		PM	19.4	C	No
46	Coast Highway - West Street	SSSC	AM	9.6	A	RBT	AM	4.9	A	No
			PM	11.2	B		PM	7.3	A	No
47	Coast Highway - Kelly Street	SSSC	AM	10	B	SSSC	AM	14.2	B	No
			PM	12.7	B		PM	**69.4**	**F**	**Yes**
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	15	B	Signalized	AM	16.6	B	No
			PM	37.4	D		PM	45.6	D	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	4.9	A	Signalized	AM	5	A	No
			PM	4.5	A		PM	4.8	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	25.4	C	Signalized	AM	27	C	No
			PM	27.8	C		PM	31.6	C	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	11.6	B	Signalized	AM	11.3	B	No
			PM	13.8	B		PM	13.3	B	No
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	AM	**50.2**	**D**	Signalized	AM	**75.9**	**E**	**Yes**
			PM	**42.6**	**D**		PM	**51.1**	**D**	**Yes**
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	**37.7**	**D**	Signalized	AM	**40.0**	**D**	Yes
			PM	**65.7**	**E**		PM	**71.9**	**E**	Yes
54	California - I-5 NB On-Ramp	AWSC	AM	7.6	A	AWSC	AM	7.7	A	No
			PM	7.6	A		PM	7.6	A	No
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	9.3	A	SSSC	AM	9.3	A	No
			PM	9.5	A		PM	9.5	A	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 1				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	25.8	C	Signalized	AM	32.7	C	No
			PM	**88**	**F**		PM	**89.9**	**F**	**Yes**

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. OVF – Overflow, Synchro is unable to calculate a level of delay
F. RBT – Roundabout
G. The minimum acceptable LOS is "D" for intersections 1-47
H. The minimum acceptable LOS is "D"; a change from C or D to a lower LOS will cause an impact for intersections 48-56

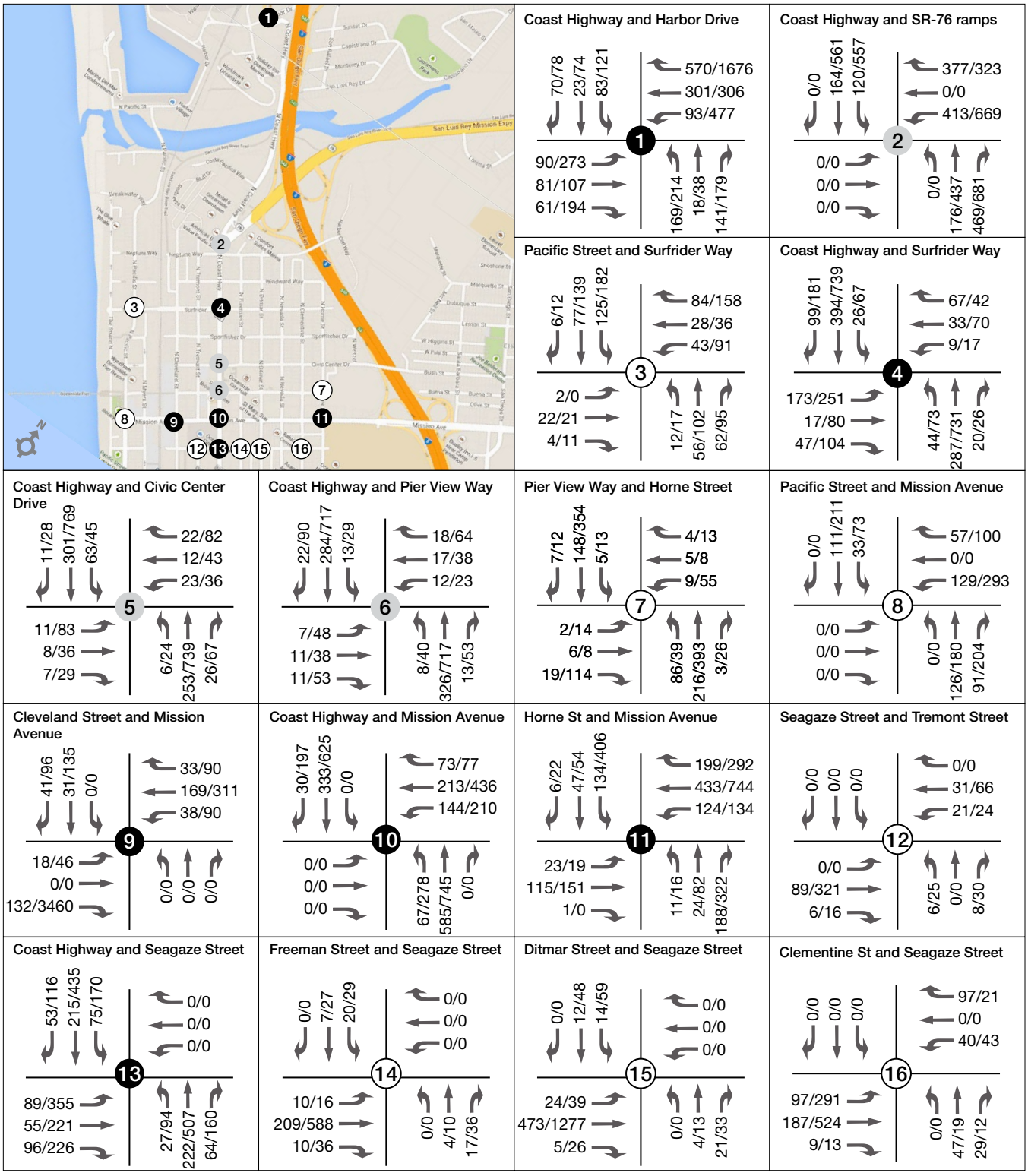
The following intersections are identified to generate significant impacts in the future with project conditions:

- Coast Highway & Pier View Way (#6)
- Seagaze Street & Ditmar Street (#15)
- Coast Highway & Wisconsin Boulevard (#21)
- Vista Way & Ditmar Street (#42)
- Coast Highway & Kelly Street (#47)
- Oceanside Boulevard & SB On/Off-Ramp (#52)
- Oceanside Boulevard & NB On/Off-Ramp (#53)
- Vista Way & I-5 SB On/Off Ramp (#56)

All other intersections are not impacted by the proposed project alternative 1.

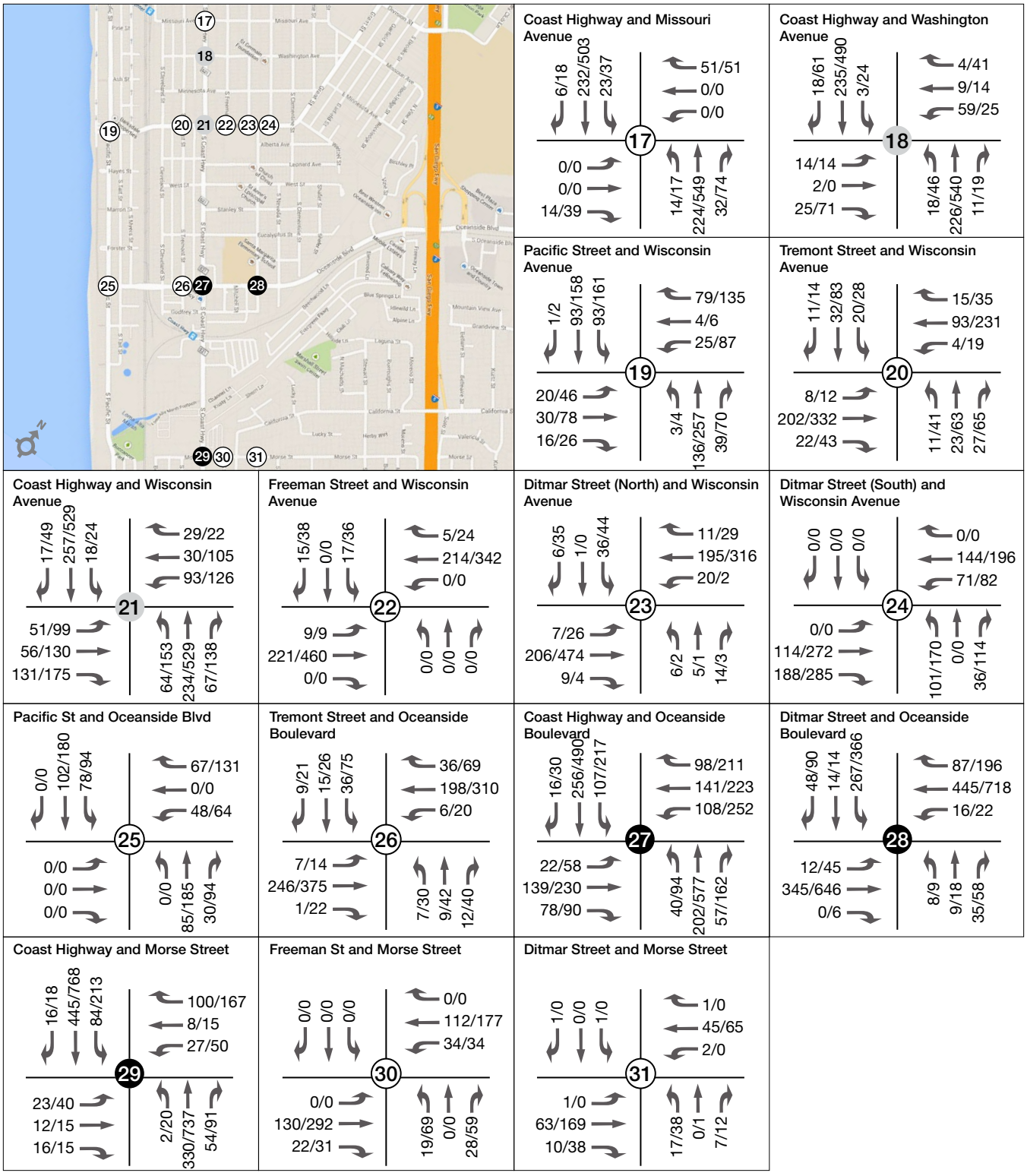
Mitigation measures are discussed in Section 7.

Figure 5-5a Future with Project Alternative 1 Peak Hour Volumes - AM & PM



OCEANSIDE COAST HIGHWAY CORRIDOR STUDY

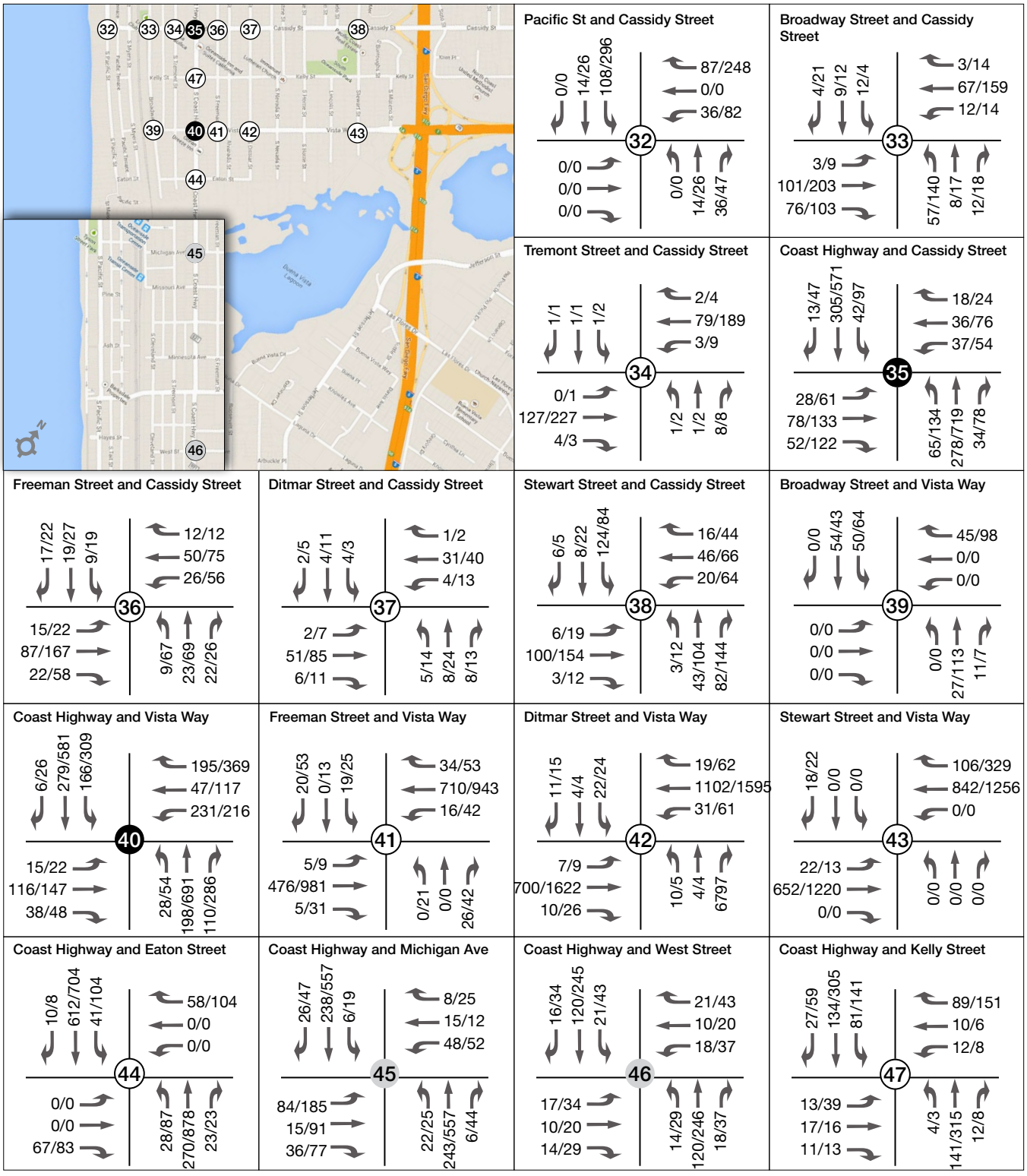
Figure 5-5b Future with Project Alternative 1 Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

Figure 5-5c Future with Project Alternative 1 Peak Hour Volumes - AM & PM



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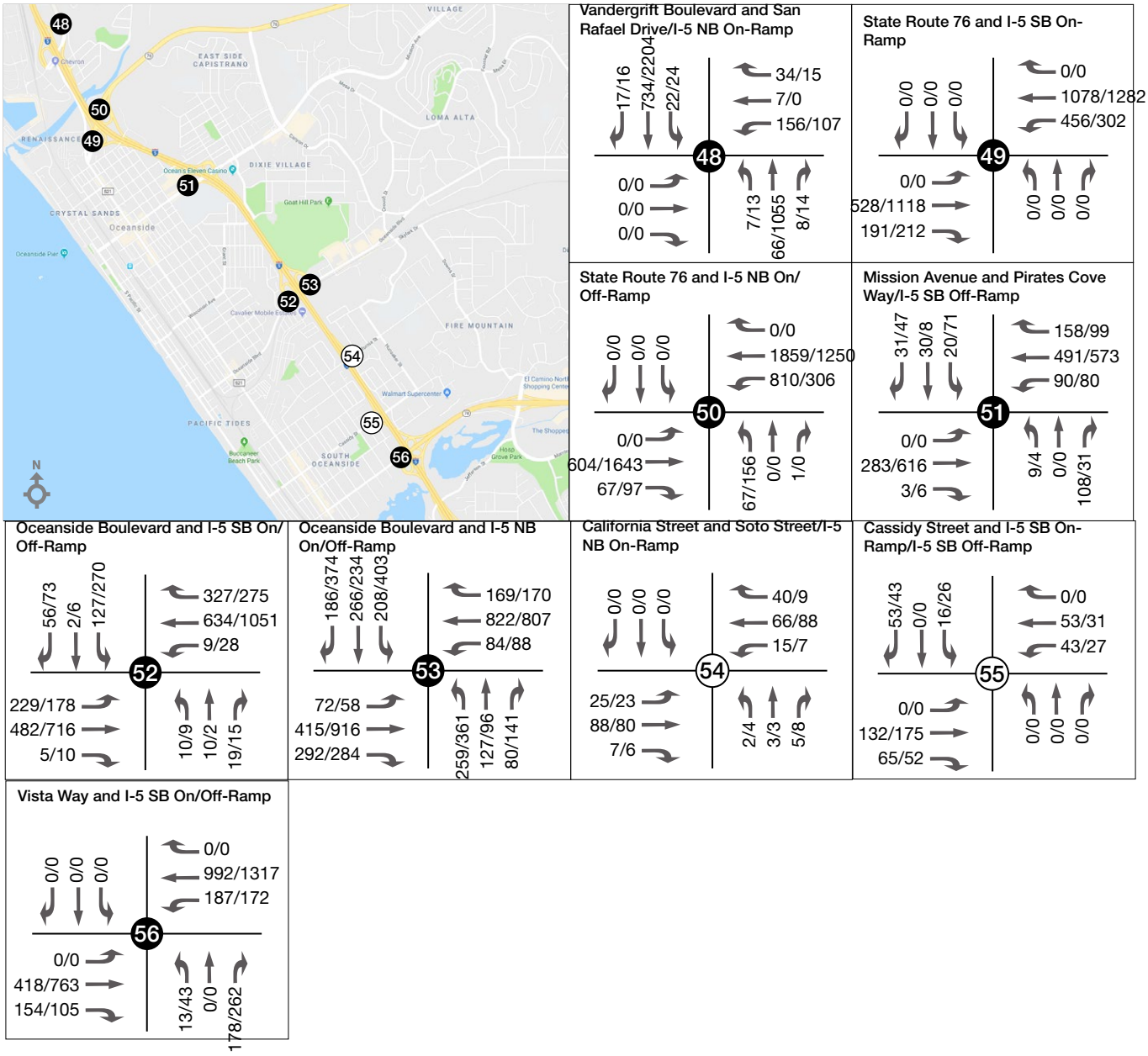
COAST HIGHWAY
CORRIDOR STUDY

Figure 5-5d Future with Project Alternative 1 Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

Figure 5-6a Future with Project Alternative 1 (Existing SR-78) Peak Hour Volumes - AM & PM

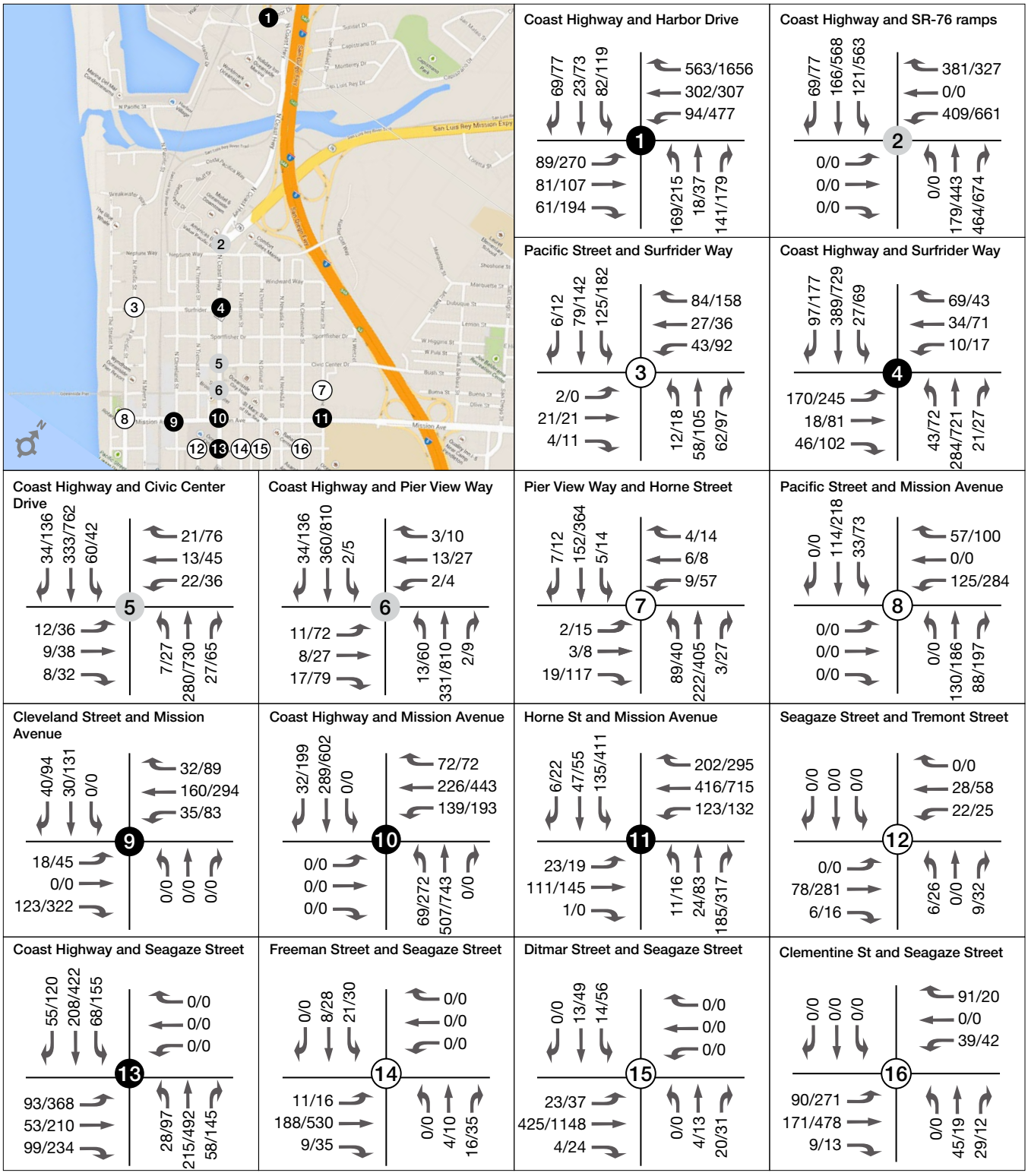
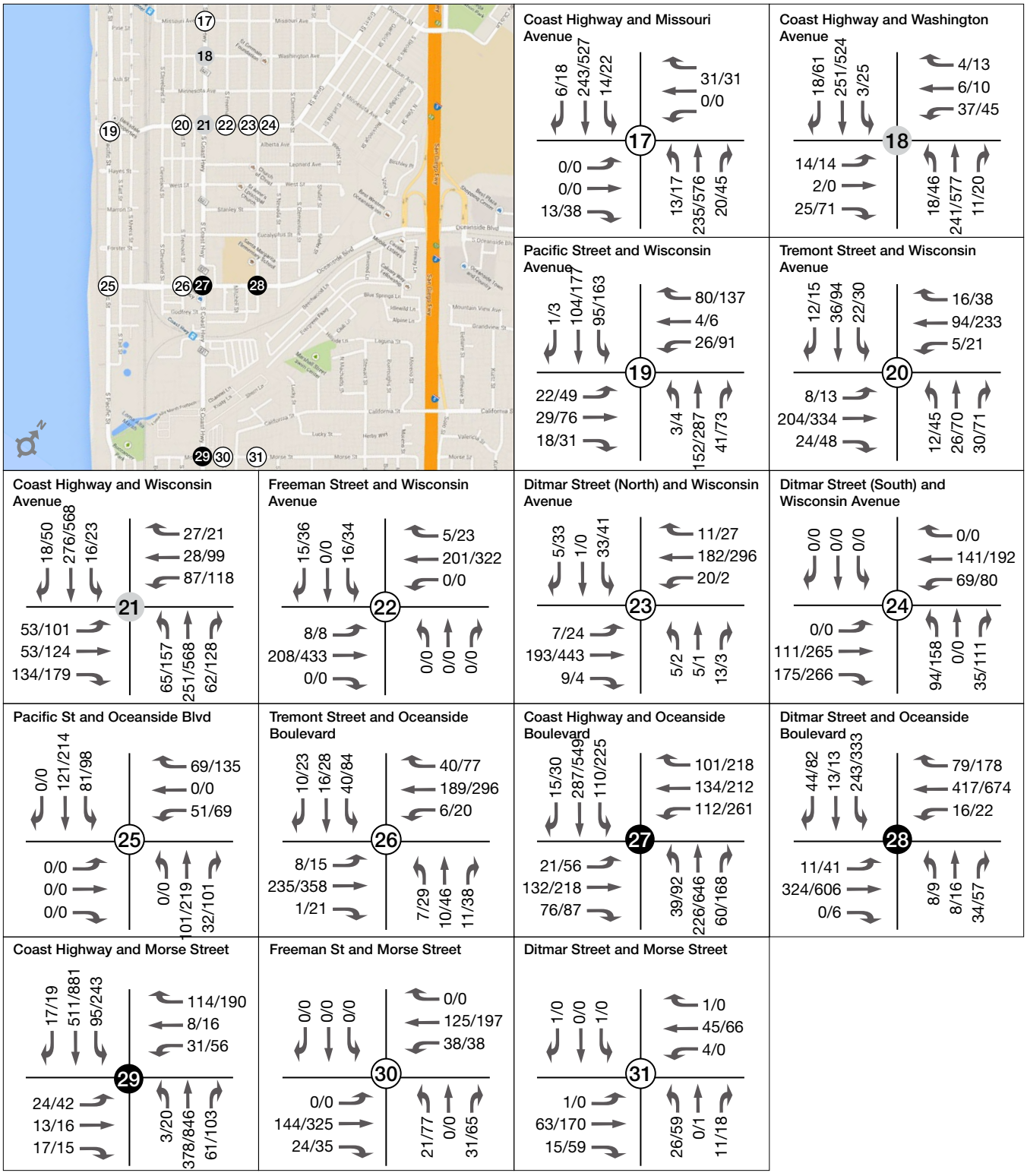


Figure 5-6b Future with Project Alternative 1 (Existing SR-78) Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

Figure 5-6c Future with Project Alternative 1 (Existing SR-78) Peak Hour Volumes - AM & PM

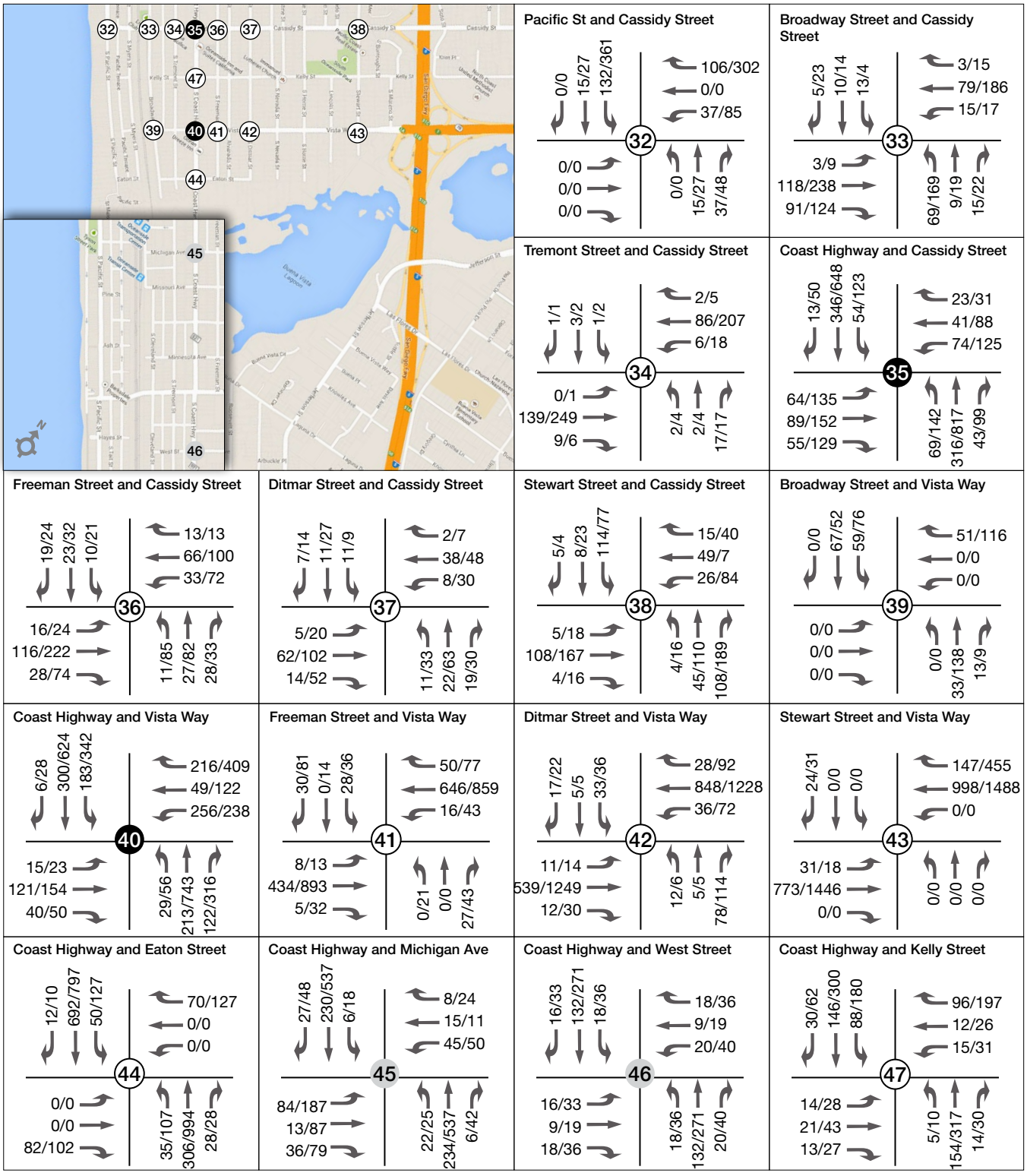


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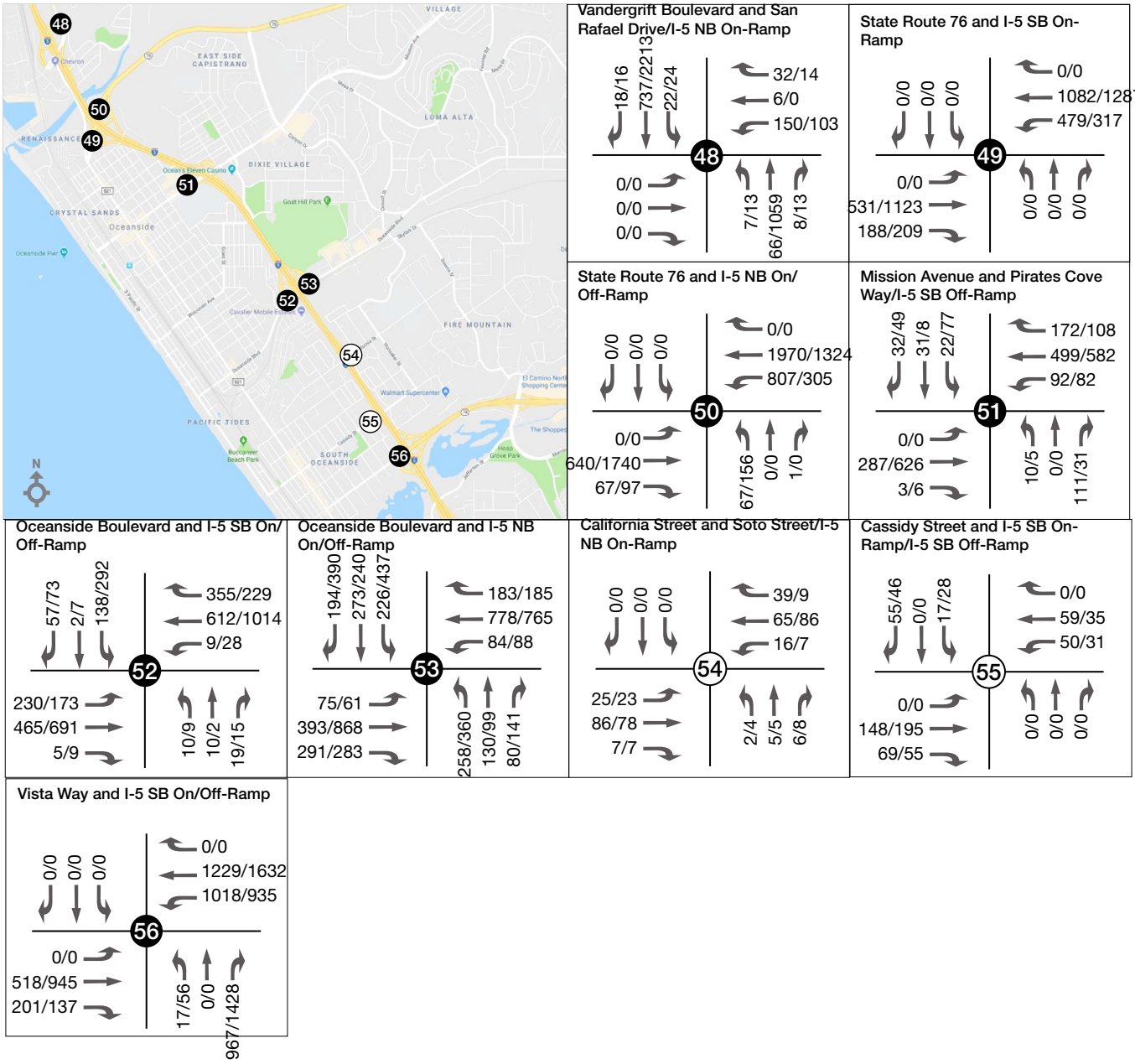
Figure 5-6d Future with Project Alternative 1 (Existing SR-78) Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

5.4 Year 2035 Future Conditions with Project Alternative 2 (Four-Lanes between Morse St and Vista Way) – Modified Vision Plan

This section examines traffic conditions with the Coast Highway Corridor project alternative 2 which proposes 2 lanes between Harbor Drive and Morse Street and four lanes between Morse St and Vista Way with seven new roundabouts as described in section 3.6.4. The analysis was conducted for the Future (2035) under the Modified Vision Plan conditions.

5.4.1 Road Segment Volumes

Road segment volumes have been included for noise modeling purposes. Future road segment volumes with project alternative 2 are found in Appendix A. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

5.4.2 Intersection Level of Service

This section examines traffic conditions with and without the Coast Highway Corridor project alternative 2. The analysis was conducted for the future conditions.

The intersection operations analysis for the future condition with project alternative 2 was performed consistent with the methodology outlined in Section 3. Table 5-7 presents the results for the future conditions traffic analysis with project alternative 2. A comparison between the future condition without and with project alternative 2 is also provided. Figure 5-7 contains the traffic volumes used for the future conditions with project alternative 2 analysis.

Table 5-7: LOS Analysis – Future Conditions with Project Alternative 2

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	30.4	C	Signalized	AM	29.8	C	No
			PM	**65.3**	**E**		PM	46.8	D	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	13.3	B	RBT	AM	3.9	A	No
			PM	27.7	C		PM	26.7	D	No
3	Surfrider Way - Pacific Street	AWSC	AM	9.7	A	AWSC	AM	9	A	No
			PM	14.5	B		PM	12.8	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	12.8	B	Signalized	AM	12.9	B	No
			PM	15.6	B		PM	19.2	B	No
5	Coast Highway - Civic Center Drive	Signalized	AM	26.8	C	RBT	AM	7.4	A	No
			PM	14.6	B		PM	32	D	No
6	Coast Highway - Pier View Way	Signalized	AM	13.6	B	RBT	AM	6.6	A	No
			PM	12.5	B		PM	29.1	D	No
7	Pier View Way - Horne Street	AWSC	AM	9.2	A	AWSC	AM	8.8	A	No
			PM	15.6	C		PM	11.5	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	9.2	A	AWSC	AM	9	A	No
			PM	17.3	C		PM	16.8	C	No
9	Mission Avenue - Cleveland Street	Signalized	AM	30.4	C	Signalized	AM	14.8	B	No
			PM	18.5	B		PM	12.4	B	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
10	Coast Highway - Mission Avenue	Signalized	AM	10.6	B	Signalized	AM	16.4	B	No
			PM	14	B		PM	26.6	C	No
11	Mission Avenue - Horne Street	Signalized	AM	7.1	A	Signalized	AM	14.7	B	No
			PM	12.1	B		PM	13.5	B	No
12	Seagaze Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	9.2	A	No
			PM	22.2	C		PM	11.6	B	No
13	Coast Highway - Seagaze Street	Signalized	AM	18.7	B	Signalized	AM	12.5	B	No
			PM	23.9	C		PM	18	B	No
14	Seagaze Street - Freeman Street	SSSC	AM	10	B	SSSC	AM	10.1	B	No
			PM	14.4	B		PM	15.2	C	No
15	Seagaze Street - Ditmar Street	AWSC	AM	8.5	A	AWSC	AM	9	A	No
			PM	33.3	D		PM	**55.5**	**F**	**Yes**
16	Seagaze Street - Clementine Street	SSSC	AM	8.1	A	SSSC	AM	8.3	A	No
			PM	14.1	B		PM	16.6	C	No
17	Coast Highway - Missouri Avenue	SSSC	AM	13.1	B	SSSC	AM	10.1	B	No
			PM	33.7	D		PM	13.7	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	12.4	B	RBT	AM	5.8	A	No
			PM	31.9	D		PM	11.7	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	9.7	A	AWSC	AM	9	A	No
			PM	28.7	D		PM	15.7	C	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	11.5	B	SSSC	AM	12.5	B	No
			PM	18.4	C		PM	26.6	D	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	10.6	B	RBT	AM	8.3	A	No
			PM	19.3	B		PM	**49.2**	**E**	**Yes**
22	Wisconsin Avenue - Freeman Street	SSSC	AM	9	A	SSSC	AM	11.2	B	No
			PM	9.5	A		PM	15.8	C	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	9.6	A	SSSC	AM	13.4	B	No
			PM	9.8	A		PM	19.6	C	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	7.5	A	AWSC	AM	9.8	A	No
			PM	7.8	A		PM	24.2	C	No
25	Oceanside Boulevard - Pacific Street	AWSC	AM	8.4	A	AWSC	AM	8.4	A	No
			PM	9.8	A		PM	10.8	B	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	12.4	B	SSSC	AM	14	B	No
			PM	24.6	C		PM	**41.1**	**E**	**Yes**
27	Coast Highway - Oceanside Boulevard	Signalized	AM	16.4	B	Signalized	AM	27	C	No
			PM	**58.5**	**E**		PM	45	D	No
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	19.1	B	Signalized	AM	15.8	B	No
			PM	8.1	A		PM	18	B	No
29	Coast Highway - Morse Street	Signalized	AM	16.4	B	Signalized	AM	8.5	A	No
			PM	15.5	B		PM	14	B	No
30	Morse Street - Freeman Street	SSSC	AM	9.8	A	SSSC	AM	10.2	B	No
			PM	13.1	B		PM	14.9	B	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
31	Morse Street - Ditmar Street	SSSC	AM	9.1	A	SSSC	AM	9.2	A	No
			PM	10	B		PM	10.5	B	No
32	Cassidy Street - Pacific Street	AWSC	AM	8.1	A	AWSC	AM	7.9	A	No
			PM	11.1	B		PM	12	B	No
33	Cassidy Street - Broadway Street	SSSC	AM	11.5	B	SSSC	AM	10.9	B	No
			PM	23.8	C		PM	18.7	C	No
34	Cassidy Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	9.8	A	No
			PM	13.1	B		PM	11.7	B	No
35	Coast Highway - Cassidy Street	Signalized	AM	15.5	B	Signalized	AM	14.2	B	No
			PM	19.6	B		PM	51.1	D	No
36	Cassidy Street - Freeman Street	SSSC	AM	11.7	B	SSSC	AM	10.4	B	No
			PM	21.2	C		PM	17.1	C	No
37	Cassidy Street - Ditmar Street	AWSC	AM	8.7	A	AWSC	AM	7.2	A	No
			PM	11.6	B		PM	7.6	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	11	B	AWSC	AM	8.5	A	No
			PM	24.5	C		PM	10.5	B	No
39	Vista Way - Broadway Street	SSSC	AM	7.8	A	SSSC	AM	7.8	A	No
			PM	8.2	A		PM	8.2	A	No
40	Coast Highway - Vista Way	Signalized	AM	25	C	Signalized	AM	32	C	No
			PM	45.1	D		PM	50.7	D	No
41	Vista Way - Freeman Street	SSSC	AM	13.5	B	SSSC	AM	14.7	B	No
			PM	20	C		PM	27.5	D	No
42	Vista Way - Ditmar Street	SSSC	AM	14.8	B	SSSC	AM	19.9	C	No
			PM	25	D		PM	**472.7**	**F**	**Yes**
43	Vista Way - Stewart Street	SSSC	AM	13.2	B	SSSC	AM	17.5	C	No
			PM	20.2	C		PM	**35.3**	**E**	**Yes**
44	Coast Highway - Eaton Street	SSSC	AM	14.4	B	SSSC	AM	16	C	No
			PM	16.2	C		PM	19.2	C	No
45	Coast Highway - Michigan Avenue	Signalized	AM	7.5	A	RBT	AM	6.4	A	No
			PM	6.6	A		PM	20.1	C	No
46	Coast Highway - West Street	SSSC	AM	11.4	B	RBT	AM	4.7	A	No
			PM	18	C		PM	6.9	A	No
47	Coast Highway - Kelly Street	SSSC	AM	10.2	B	SSSC	AM	13.3	B	No
			PM	13.9	B		PM	33.9	D	No
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	15	B	Signalized	AM	16.6	B	No
			PM	36.6	D		PM	45.6	D	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	4.8	A	Signalized	AM	5.0	A	No
			PM	4.5	A		PM	4.8	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	21.5	C	Signalized	AM	27.0	C	No
			PM	22.4	C		PM	31.6	C	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	11.5	B	Signalized	AM	11.3	B	No
			PM	13.5	B		PM	13.3	B	No
52		Signalized	AM	**43.5**	**D**	Signalized	AM	**75.9**	**E**	Yes

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
	Oceanside - I-5 SB On/Off-Ramp		PM	**42.4**	**D**		PM	**51.1**	**D**	Yes
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	**39.8**	**D**	Signalized	AM	**40.0**	**D**	Yes
			PM	**65.3**	**E**		PM	**71.9**	**E**	Yes
54	California - I-5 NB On-Ramp	AWSC	AM	7.6	A	AWSC	AM	7.7	A	No
			PM	7.5	A		PM	7.6	A	No
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	9.2	A	SSSC	AM	9.3	A	No
			PM	9.3	A		PM	9.5	A	No
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	20.4	C	Signalized	AM	32.7	C	No
			PM	25.7	C		PM	**89.9**	**F**	**Yes**

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. OVF – Overflow, Synchro is unable to calculate a level of delay
F. RBT – Roundabout
G. The minimum acceptable LOS is “D” for intersections 1-47
H. The minimum acceptable LOS is “D”; a change from C or D to a lower LOS will cause an impact for intersections 48-56

The following intersections are identified to generate significant impacts in the future with project conditions:

- Seagaze Street & Ditmar Street (#15)
- Coast Highway & Wisconsin Boulevard (#21)
- Oceanside Boulevard & Tremont Street (#26)
- Vista Way & Ditmar Street (#42)
- Vista Way & Stewart Street (#43)
- Oceanside Boulevard & SB On/Off-Ramp (#52)
- Oceanside Boulevard & NB On/Off-Ramp (#53)
- Vista Way & I-5 SB On/Off Ramp (#56)

All other intersections are not impacted by the proposed project alternative 2.

Mitigation measures are discussed in Section 7.

5.4.3 Vista Way/SR-78 & I-5 Existing Configuration

This section examines traffic conditions with the Coast Highway Corridor project alternative 2 throughout the corridor and assumes existing network conditions for the Vista Way/SR-78 and I-5 Interchange. The analysis was conducted for future (2035) conditions.

5.4.3.1 Road Segment Volumes

Road segment volumes have been included in Appendix A for use in noise modeling purposes. Future road segment volumes are extracted from SANDAG's regional model. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

5.4.3.2 Intersection Level of Service

The intersection operations analysis for the future condition project alternative 2 was performed consistent with the methodology outlined in Section 3. Table 5-8 presents the results for the future conditions traffic analysis with the proposed project under existing Vista Way/SR-78 & I-5 Interchange configuration. Figure 5-8 contains the traffic volumes used for the future condition analysis.

Table 5-8: LOS Analysis – Future Conditions with Project Alternative 2 (Existing SR-78)

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	31.1	C	Signalized	AM	29.8	C	No
			PM	**68.9**	**E**		PM	53.7	D	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	12.7	B	RBT	AM	3	A	No
			PM	25.6	C		PM	17.8	C	No
3	Surfrider Way - Pacific Street	AWSC	AM	10.4	B	AWSC	AM	9.7	A	No
			PM	19.5	C		PM	14.6	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	16.4	B	Signalized	AM	9.8	A	No
			PM	17.1	B		PM	18	B	No
5	Coast Highway - Civic Center Drive	Signalized	AM	13.2	B	RBT	AM	7.3	A	No
			PM	15.6	B		PM	30.6	D	No
6	Coast Highway - Pier View Way	Signalized	AM	19.2	B	RBT	AM	7.1	A	No
			PM	8.7	A		PM	**46.4**	**E**	**Yes**
7	Pier View Way - Horne Street	AWSC	AM	9.4	A	AWSC	AM	8.9	A	No
			PM	17.6	C		PM	11.9	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	9.5	A	AWSC	AM	9.3	A	No
			PM	19.4	C		PM	17.6	C	No
9	Mission Avenue - Cleveland Street	Signalized	AM	18.8	B	Signalized	AM	14.8	B	No
			PM	17.7	B		PM	16.8	B	No
10	Coast Highway - Mission Avenue	Signalized	AM	12	B	Signalized	AM	15.2	B	No
			PM	12.8	B		PM	30.6	C	No
11	Mission Avenue - Horne Street	Signalized	AM	6.9	A	Signalized	AM	13.3	B	No
			PM	10.7	B		PM	12.8	B	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
12	Seagaze Street - Tremont Street	SSSC	AM	9.8	A	SSSC	AM	9.1	A	No
			PM	17.1	C		PM	11.2	B	No
13	Coast Highway - Seagaze Street	Signalized	AM	15.8	B	Signalized	AM	13.1	B	No
			PM	22.7	C		PM	16.7	B	No
14	Seagaze Street - Freeman Street	SSSC	AM	10.1	B	SSSC	AM	10	B	No
			PM	15	B		PM	14.4	B	No
15	Seagaze Street - Ditmar Street	AWSC	AM	8.6	A	AWSC	AM	8.7	A	No
			PM	30.2	D		PM	**38**	**E**	**Yes**
16	Seagaze Street - Clementine Street	SSSC	AM	8.3	A	SSSC	AM	8.2	A	No
			PM	17.7	C		PM	14.3	B	No
17	Coast Highway - Missouri Avenue	SSSC	AM	10.8	B	SSSC	AM	10	A	No
			PM	15.7	C		PM	13.3	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	9.9	A	RBT	AM	5.9	A	No
			PM	13.8	B		PM	12.9	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	10.1	B	AWSC	AM	9.7	A	No
			PM	**51.3**	**F**		PM	20.4	C	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	10.8	B	SSSC	AM	12.7	B	No
			PM	14.9	B		PM	30.8	D	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	14.5	B	RBT	AM	8.5	A	No
			PM	24.5	C		PM	**57.8**	**F**	**Yes**
22	Wisconsin Avenue - Freeman Street	SSSC	AM	11.5	B	SSSC	AM	10.9	B	No
			PM	19.4	C		PM	14.9	B	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	13.2	B	SSSC	AM	13.1	B	No
			PM	17.9	C		PM	17.9	C	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	9.5	A	AWSC	AM	9.7	A	No
			PM	23.7	C		PM	26.5	D	No
25	Oceanside Boulevard - Pacific Street	AWSC	AM	9.1	A	AWSC	AM	9.2	A	No
			PM	12.1	B		PM	12.6	B	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	14.3	B	SSSC	AM	13.8	B	No
			PM	**91**	**F**		PM	**42**	**E**	No
27	Coast Highway - Oceanside Boulevard	Signalized	AM	26.2	C	Signalized	AM	26.7	C	No
			PM	32.1	C		PM	47.4	D	No
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	14.9	B	Signalized	AM	15.3	B	No
			PM	15.3	B		PM	15.6	B	No
29	Coast Highway - Morse Street	Signalized	AM	19.6	B	Signalized	AM	9.4	A	No
			PM	22.9	C		PM	15	B	No
30	Morse Street - Freeman Street	SSSC	AM	12.9	B	SSSC	AM	10.5	B	No
			PM	**112.9**	**F**		PM	16.8	C	No
31	Morse Street - Ditmar Street	SSSC	AM	9.5	A	SSSC	AM	9.3	A	No
			PM	11.5	B		PM	10.9	B	No
32	Cassidy Street - Pacific Street	AWSC	AM	8.6	A	AWSC	AM	8.6	A	No
			PM	16.8	C		PM	17	C	No
33	Cassidy Street - Broadway Street	SSSC	AM	16	C	SSSC	AM	11.6	B	No
			PM	**397.4**	**F**		PM	26.5	D	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
34	Cassidy Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	10.3	B	No
			PM	13.1	B		PM	12.7	B	No
35	Coast Highway - Cassidy Street	Signalized	AM	18.5	B	Signalized	AM	12.8	B	No
			PM	20	C		PM	31.5	C	No
36	Cassidy Street - Freeman Street	SSSC	AM	21.4	C	SSSC	AM	11	B	No
			PM	**OVF**	**F**		PM	26.1	D	No
37	Cassidy Street - Ditmar Street	AWSC	AM	7.6	A	AWSC	AM	7.5	A	No
			PM	8.6	A		PM	8.5	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	9.2	A	AWSC	AM	8.9	A	No
			PM	13.8	B		PM	12.4	B	No
39	Vista Way - Broadway Street	SSSC	AM	8.5	A	SSSC	AM	8	A	No
			PM	9.4	A		PM	8.4	A	No
40	Coast Highway - Vista Way	Signalized	AM	32.8	C	Signalized	AM	35.3	D	No
			PM	**78.9**	**E**		PM	54.9	D	No
41	Vista Way - Freeman Street	SSSC	AM	34	D	SSSC	AM	16.8	C	No
			PM	**OVF**	**F**		PM	**49.4**	**E**	No
42	Vista Way - Ditmar Street	SSSC	AM	26.2	D	SSSC	AM	25.2	D	No
			PM	**294.2**	**F**		PM	**OVF**	**F**	**Yes**
43	Vista Way - Stewart Street	SSSC	AM	22	C	SSSC	AM	22.1	C	No
			PM	**69.1**	**F**		PM	66.8	F	No
44	Coast Highway - Eaton Street	SSSC	AM	14.9	B	SSSC	AM	18.8	C	No
			PM	17.4	C		PM	24.5	C	No
45	Coast Highway - Michigan Avenue	Signalized	AM	4.7	A	RBT	AM	6.4	A	No
			PM	5.4	A		PM	19.4	C	No
46	Coast Highway - West Street	SSSC	AM	9.6	A	RBT	AM	4.9	A	No
			PM	11.2	B		PM	7.3	A	No
47	Coast Highway - Kelly Street	SSSC	AM	10	B	SSSC	AM	14.2	B	No
			PM	12.7	B		PM	**69.4**	**F**	**Yes**
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	15	B	Signalized	AM	16.6	B	No
			PM	37.4	D		PM	45.6	D	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	4.9	A	Signalized	AM	5	A	No
			PM	4.5	A		PM	4.8	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	25.4	C	Signalized	AM	27	C	No
			PM	27.8	C		PM	31.6	C	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	11.6	B	Signalized	AM	11.3	B	No
			PM	13.8	B		PM	13.3	B	No
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	AM	**50.2**	**D**	Signalized	AM	**73.2**	**E**	**Yes**
			PM	**42.6**	**D**		PM	**51.1**	**D**	**Yes**
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	**37.7**	**D**	Signalized	AM	**40**	**D**	Yes
			PM	**65.7**	**E**		PM	**71.9**	**D**	Yes
54	California - I-5 NB On-Ramp	AWSC	AM	7.6	A	AWSC	AM	7.7	A	No
			PM	7.6	A		PM	7.6	A	No
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	9.3	A	SSSC	AM	9.3	A	No
			PM	9.5	A		PM	9.5	A	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 2				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	25.8	C	Signalized	AM	32.7	C	No
			PM	**88**	**F**		PM	**89.9**	**F**	**Yes**

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. OVF – Overflow, Synchro is unable to calculate a level of delay
F. RBT – Roundabout
G. The minimum acceptable LOS is "D" for intersections 1-47
H. The minimum acceptable LOS is "D"; a change from C or D to a lower LOS will cause an impact for intersections 48-56

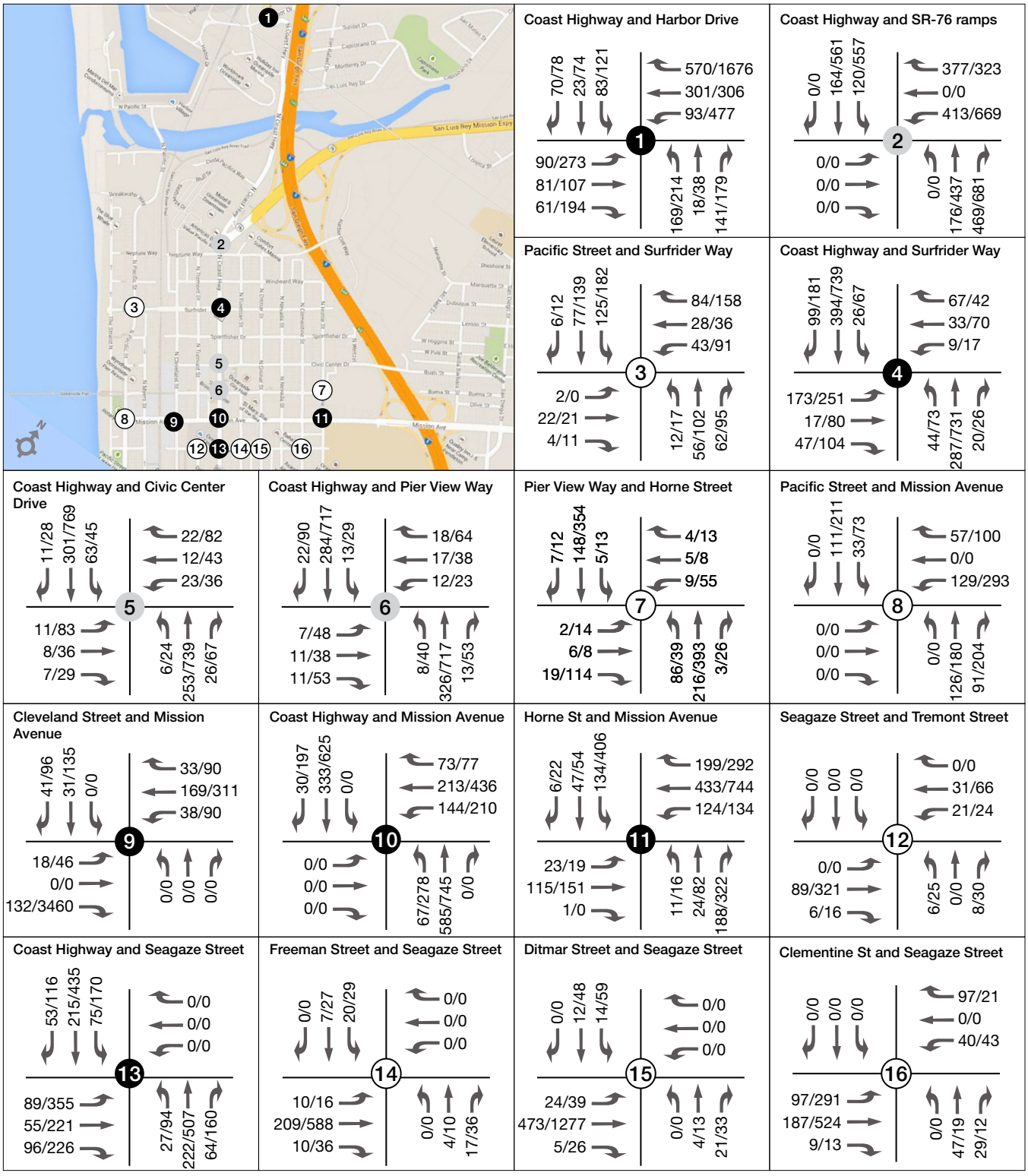
The following intersections are identified to generate significant impacts in the PM peak hour in the future with project conditions:

- Coast Highway & Pier View Way (#6)
- Seagaze Street & Ditmar Street (#15)
- Coast Highway & Wisconsin Boulevard (#21)
- Vista Way & Ditmar Street (#42)
- Coast Highway & Kelly Street (#47)
- Oceanside Boulevard & SB On/Off-Ramp (#52)
- Oceanside Boulevard & NB On/Off-Ramp (#53)
- Vista Way & I-5 SB On/Off Ramp (#56)

All other intersections are not impacted by the proposed project alternative 2.

Mitigation measures are discussed in Section 7.

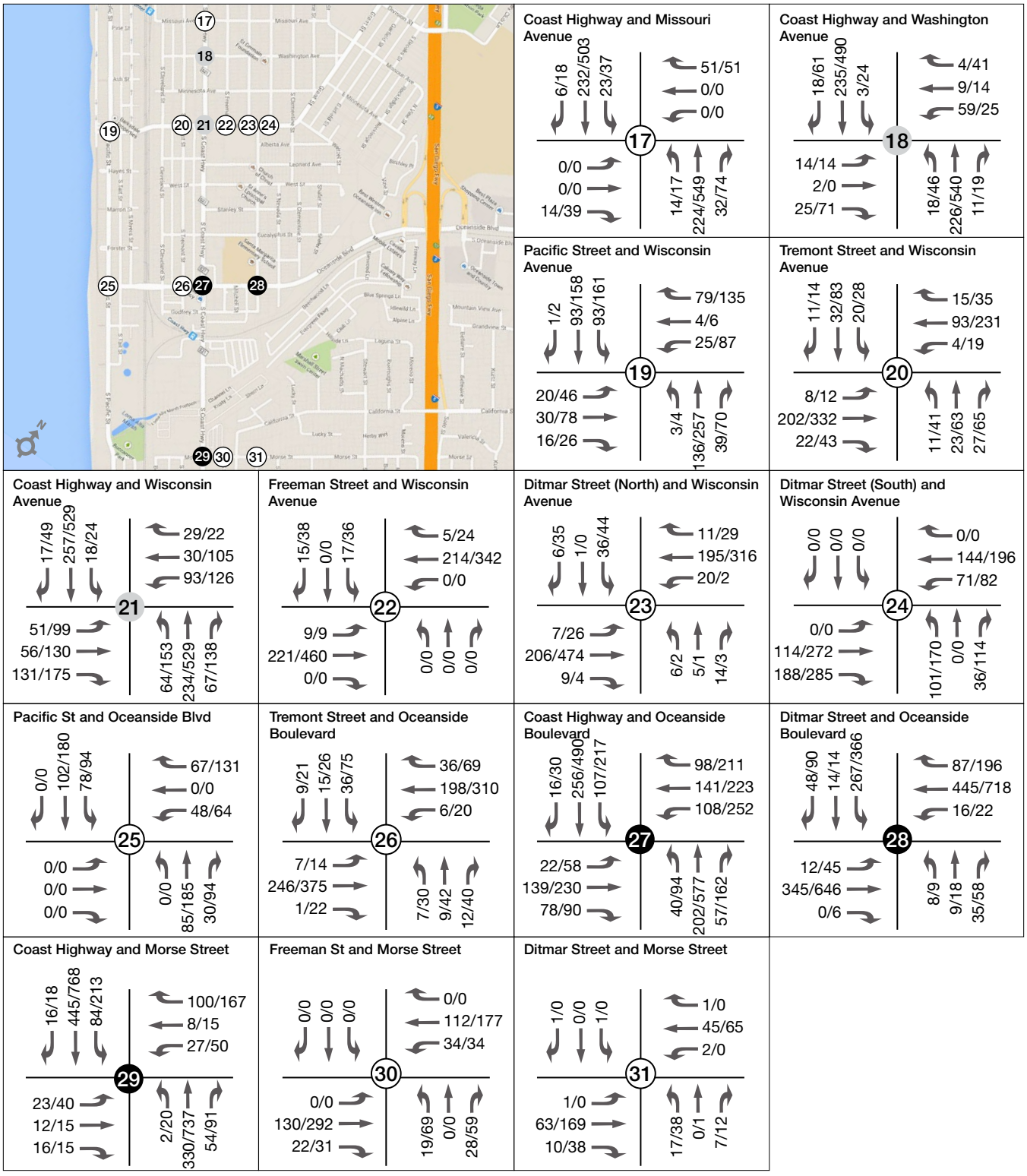
Figure 5-7a Future with Project Alternative 2 Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

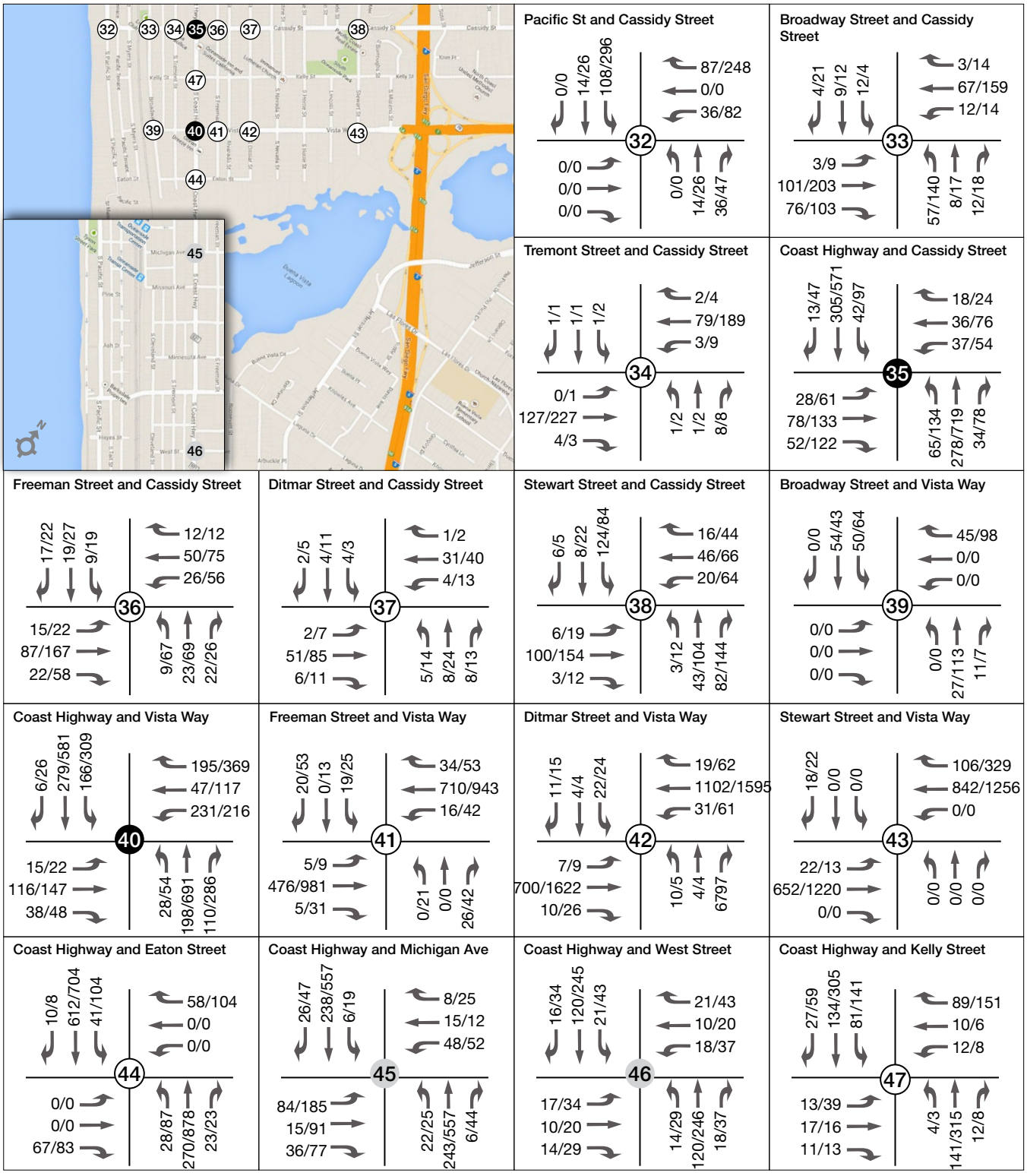
Figure 5-7b Future with Project Alternative 2 Peak Hour Volumes - AM & PM



Legend

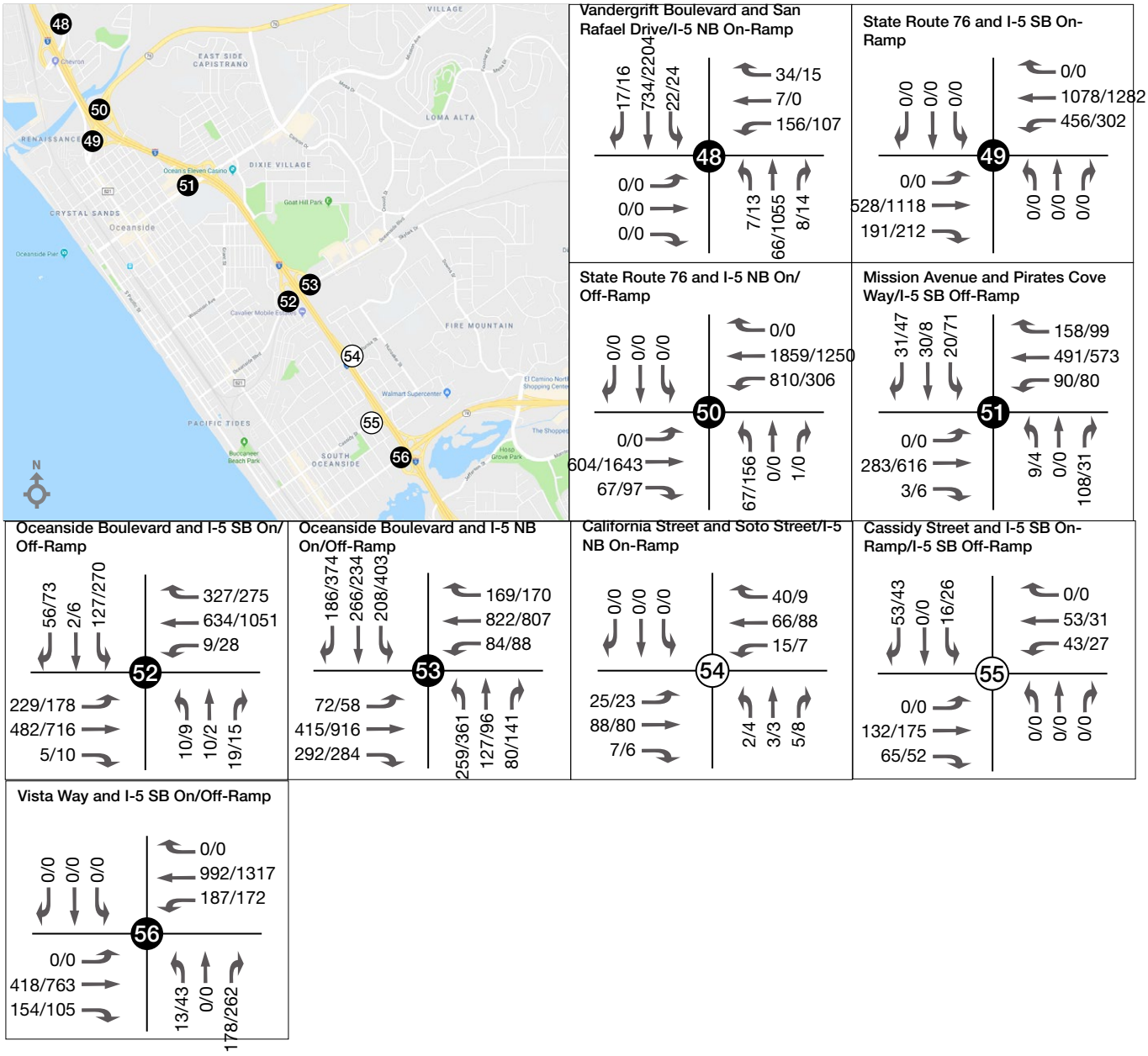
Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

Figure 5-7c Future with Project Alternative 2 Peak Hour Volumes - AM & PM



OCEANSIDE
COAST HIGHWAY
CORRIDOR STUDY

Figure 5-7d Future with Project Alternative 2 Peak Hour Volumes - AM & PM

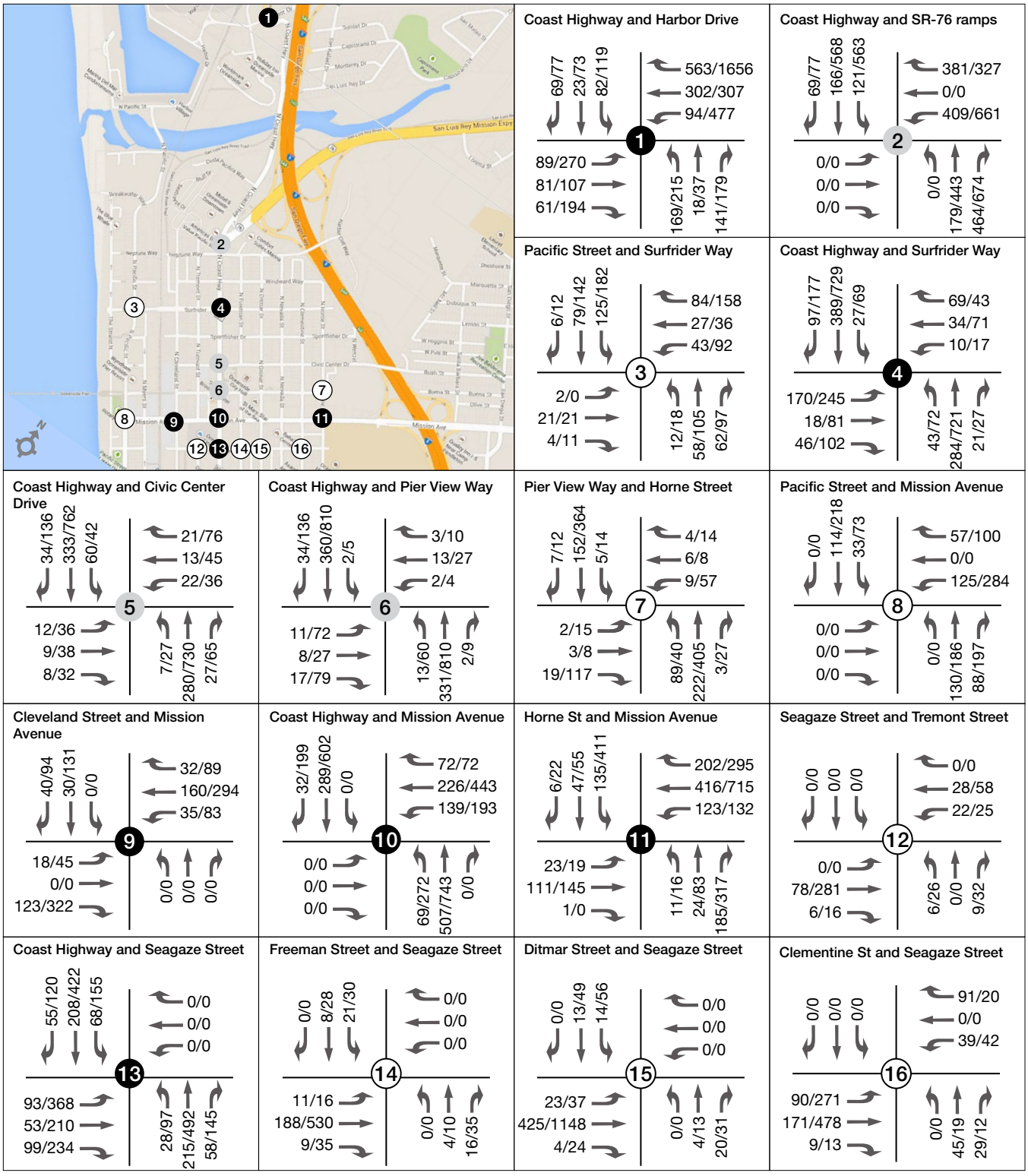


Legend

● Signalized Intersections ○ Unsignalized Intersections ● Roundabout Intersections ##/## AM/PM Turning Movement Volume

OCEANSIDE COAST HIGHWAY CORRIDOR STUDY

Figure 5-8a Future with Project Alternative 2 (Existing SR-78) Peak Hour Volumes - AM & PM



OCEANSIDE
COAST HIGHWAY
CORRIDOR STUDY

Figure 5-8b Future with Project Alternative 2 (Existing SR-78) Peak Hour Volumes - AM & PM

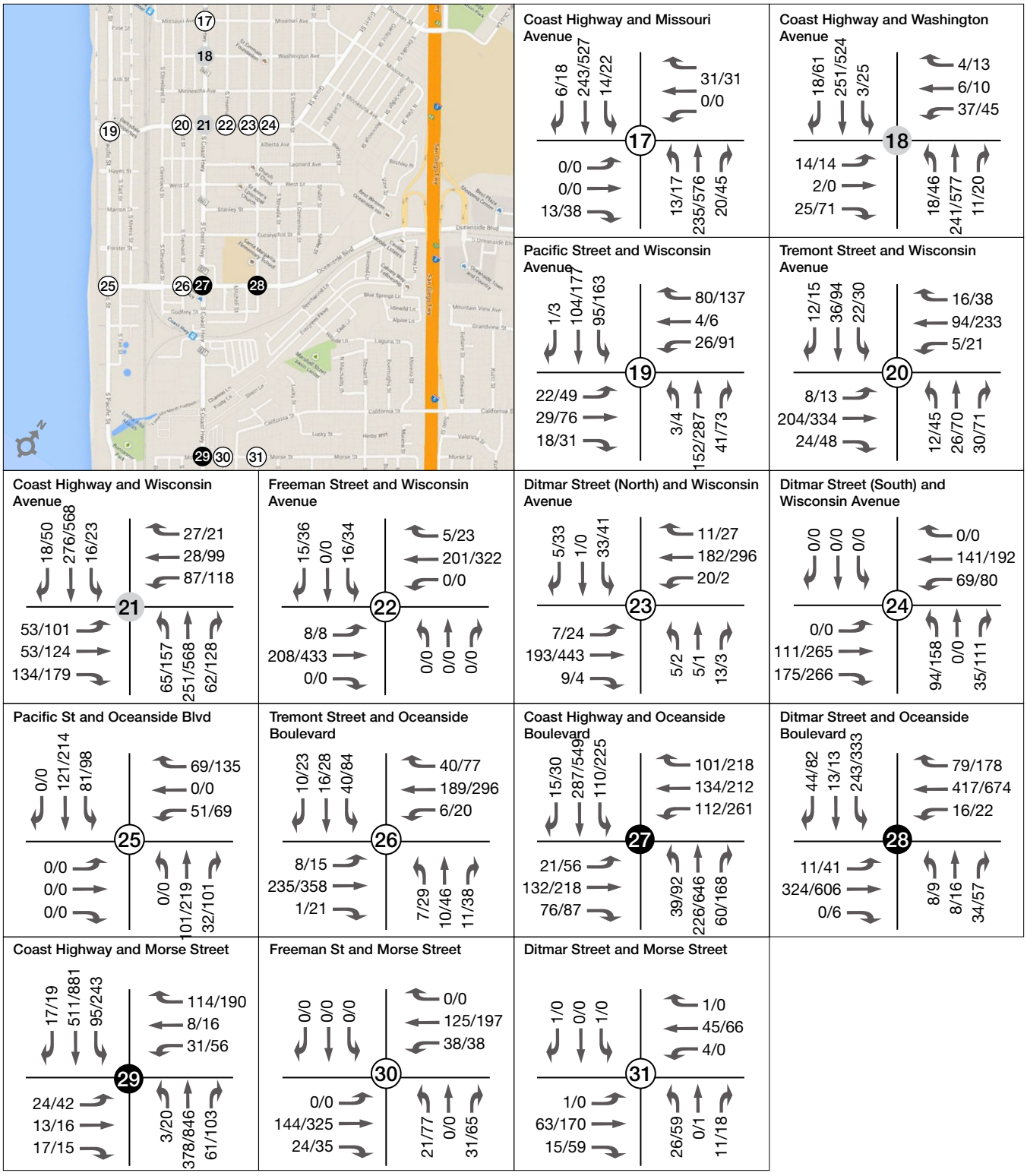
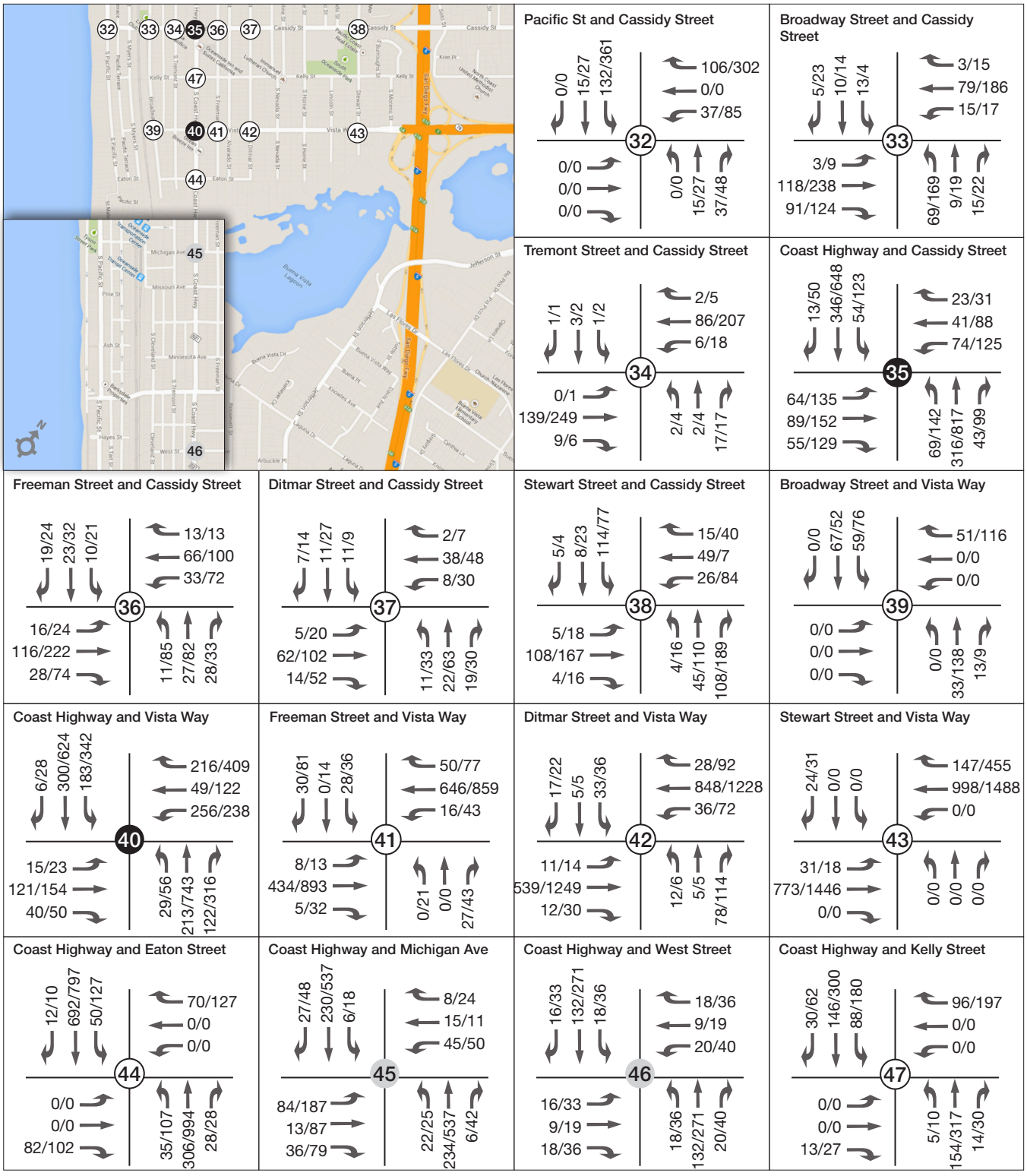
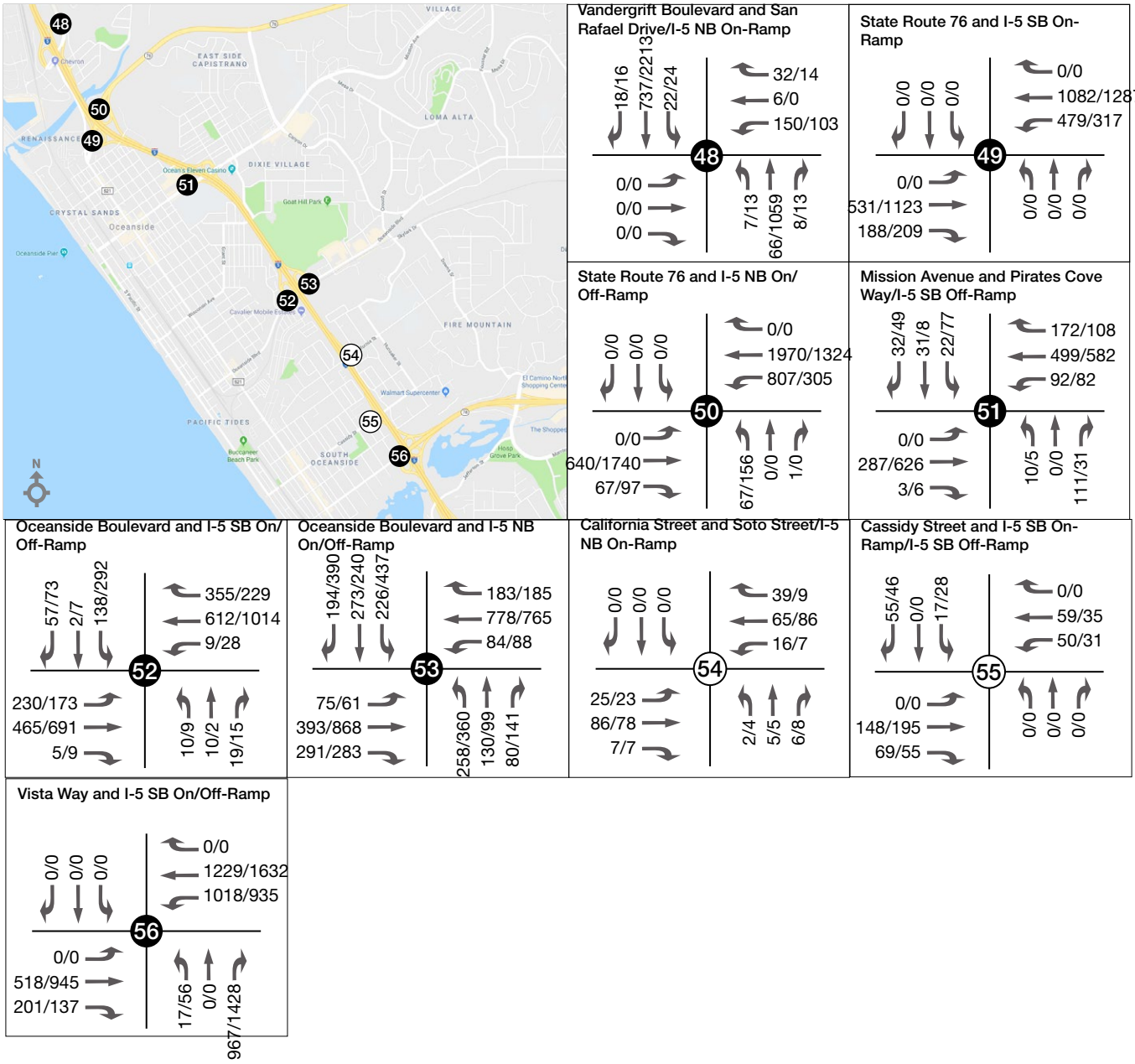


Figure 5-8c Future with Project Alternative 1 (Existing SR-78) Peak Hour Volumes - AM & PM



OCEANSIDE COAST HIGHWAY CORRIDOR STUDY

Figure 5-8d Future with Project Alternative 2 (Existing SR-78) Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

5.5 Year 2035 Future Conditions with Project Alternative 3 (Four-Lanes between Morse St and Vista Way) – General Vision Plan

This section examines traffic conditions with the Coast Highway Corridor project alternative 3 which proposes 2 lanes from Harbor Drive to Morse Street and four lanes between Morse Street and Vista Way with seven new roundabouts as described in section 3.6.3. The analysis was conducted for the Future (2035) under the Modified Vision Plan conditions.

5.5.1 Road Segment Volumes

Road segment volumes have been included for noise modeling purposes. Future road segment volumes with project alternative 3 are found in Appendix A. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

5.5.2 Intersection Level of Service

This section examines traffic conditions with and without the Coast Highway Corridor project alternative 3. The analysis was conducted for the future conditions.

The intersection operations analysis for the future condition with project alternative 3 was performed consistent with the methodology outlined in Section 3. Table 5-9 presents the results for the future conditions traffic analysis with project alternative 3. A comparison between the future condition without and with project alternative 3 is also provided. Figure 5-9 contains the traffic volumes used for the future conditions with project alternative 3 analysis.

Table 5-9: LOS Analysis – Future Conditions with Project Alternative 3

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	30.4	C	Signalized	AM	29.8	C	No
			PM	**65.3**	**E**		PM	**55.8**	**E**	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	13.3	B	RBT	AM	3	A	No
			PM	27.7	C		PM	18	C	No
3	Surfrider Way - Pacific Street	AWSC	AM	9.7	A	AWSC	AM	9.7	A	No
			PM	14.5	B		PM	14.9	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	12.8	B	Signalized	AM	9.4	A	No
			PM	15.6	B		PM	17.5	B	No
5	Coast Highway - Civic Center Drive	Signalized	AM	26.8	C	RBT	AM	7.1	A	No
			PM	14.6	B		PM	28.2	D	No
6	Coast Highway - Pier View Way	Signalized	AM	13.6	B	RBT	AM	7.3	A	No
			PM	12.5	B		PM	**66.5**	**F**	**Yes**
7	Pier View Way - Horne Street	AWSC	AM	9.2	A	AWSC	AM	9	A	No
			PM	15.6	C		PM	13.1	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	9.2	A	AWSC	AM	9.3	A	No
			PM	17.3	C		PM	17.9	C	No
9	Mission Avenue - Cleveland Street	Signalized	AM	30.4	C	Signalized	AM	12.9	B	No
			PM	18.5	B		PM	14.8	B	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
10	Coast Highway - Mission Avenue	Signalized	AM	10.6	B	Signalized	AM	14.9	B	No
			PM	14	B		PM	27.9	C	No
11	Mission Avenue - Horne Street	Signalized	AM	7.1	A	Signalized	AM	13.2	B	No
			PM	12.1	B		PM	13	B	No
12	Seagaze Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	9	A	No
			PM	22.2	C		PM	11.1	B	No
13	Coast Highway - Seagaze Street	Signalized	AM	18.7	B	Signalized	AM	13.2	B	No
			PM	23.9	C		PM	16.5	B	No
14	Seagaze Street - Freeman Street	SSSC	AM	10	B	SSSC	AM	10.1	B	No
			PM	14.4	B		PM	14.7	B	No
15	Seagaze Street - Ditmar Street	AWSC	AM	8.5	A	AWSC	AM	9	A	No
			PM	33.3	D		PM	**53.5**	**F**	**Yes**
16	Seagaze Street - Clementine Street	SSSC	AM	8.1	A	SSSC	AM	8.4	A	No
			PM	14.1	B		PM	15.7	C	No
17	Coast Highway - Missouri Avenue	SSSC	AM	13.1	B	SSSC	AM	9.9	A	No
			PM	33.7	D		PM	13	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	12.4	B	RBT	AM	5.6	A	No
			PM	31.9	D		PM	11	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	9.7	A	AWSC	AM	14.5	B	No
			PM	28.7	D		PM	17.4	C	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	11.5	B	SSSC	AM	9.4	A	No
			PM	18.4	C		PM	23	C	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	10.6	B	RBT	AM	8.1	A	No
			PM	19.3	B		PM	**42.1**	**E**	**Yes**
22	Wisconsin Avenue - Freeman Street	SSSC	AM	9	A	SSSC	AM	11.4	B	No
			PM	9.5	A		PM	17	C	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	9.6	A	SSSC	AM	14.4	B	No
			PM	9.8	A		PM	23.6	C	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	7.5	A	AWSC	AM	10.3	B	No
			PM	7.8	A		PM	**45.3**	**E**	**Yes**
25	Oceanside Boulevard - Pacific Street	AWSC	AM	8.4	A	AWSC	AM	9	A	No
			PM	9.8	A		PM	11.7	B	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	12.4	B	SSSC	AM	13.8	B	No
			PM	24.6	C		PM	**38.6**	**E**	**Yes**
27	Coast Highway - Oceanside Boulevard	Signalized	AM	16.4	B	Signalized	AM	26.7	C	No
			PM	**58.5**	**E**		PM	36.2	D	No
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	19.1	B	Signalized	AM	15.1	B	No
			PM	8.1	A		PM	19.4	B	No
29	Coast Highway - Morse Street	Signalized	AM	16.4	B	Signalized	AM	11.5	B	No
			PM	15.5	B		PM	19.7	B	No
30	Morse Street - Freeman Street	SSSC	AM	9.8	A	SSSC	AM	12	B	No
			PM	13.1	B		PM	**45.4**	**E**	**Yes**

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
31	Morse Street - Ditmar Street	SSSC	AM	9.1	A	SSSC	AM	9.4	A	No
			PM	10	B		PM	11.2	B	No
32	Cassidy Street - Pacific Street	AWSC	AM	8.1	A	AWSC	AM	8.3	A	No
			PM	11.1	B		PM	13.1	B	No
33	Cassidy Street - Broadway Street	SSSC	AM	11.5	B	SSSC	AM	11.6	B	No
			PM	23.8	C		PM	28	D	No
34	Cassidy Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	9.8	A	No
			PM	13.1	B		PM	11.2	B	No
35	Coast Highway - Cassidy Street	Signalized	AM	15.5	B	Signalized	AM	19.6	B	No
			PM	19.6	B		PM	14.2	B	No
36	Cassidy Street - Freeman Street	SSSC	AM	11.7	B	SSSC	AM	11.8	B	No
			PM	21.2	C		PM	**46.5**	**E**	**Yes**
37	Cassidy Street - Ditmar Street	AWSC	AM	8.7	A	AWSC	AM	7.6	A	No
			PM	11.6	B		PM	8.6	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	11	B	AWSC	AM	9.2	A	No
			PM	24.5	C		PM	11.8	B	No
39	Vista Way - Broadway Street	SSSC	AM	7.8	A	SSSC	AM	8.3	A	No
			PM	8.2	A		PM	9.1	A	No
40	Coast Highway - Vista Way	Signalized	AM	25	C	Signalized	AM	35.2	D	No
			PM	45.1	D		PM	50.7	D	No
41	Vista Way - Freeman Street	SSSC	AM	13.5	B	SSSC	AM	14.6	B	No
			PM	20	C		PM	29.9	D	No
42	Vista Way - Ditmar Street	SSSC	AM	14.8	B	SSSC	AM	18.9	C	No
			PM	25	D		PM	**165.8**	**F**	**Yes**
43	Vista Way - Stewart Street	SSSC	AM	13.2	B	SSSC	AM	16.5	C	No
			PM	20.2	C		PM	32.3	D	No
44	Coast Highway - Eaton Street	SSSC	AM	14.4	B	SSSC	AM	15.9	C	No
			PM	16.2	C		PM	19.3	C	No
45	Coast Highway - Michigan Avenue	Signalized	AM	7.5	A	RBT	AM	6.5	A	No
			PM	6.6	A		PM	21.8	C	No
46	Coast Highway - West Street	SSSC	AM	11.4	B	RBT	AM	4.5	A	No
			PM	18	C		PM	6.2	A	No
47	Coast Highway - Kelly Street	SSSC	AM	10.2	B	SSSC	AM	10.1	B	No
			PM	13.9	B		PM	13	B	No
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	15	B	Signalized	AM	16.6	B	No
			PM	36.6	D		PM	45.3	D	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	4.8	A	Signalized	AM	4.9	A	No
			PM	4.5	A		PM	4.7	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	21.5	C	Signalized	AM	19.3	B	No
			PM	22.4	C		PM	33.9	C	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	11.5	B	Signalized	AM	11.3	B	No
			PM	13.5	B		PM	13.4	B	No
52		Signalized	AM	**43.5**	**D**	Signalized	AM	**47.6**	**D**	Yes

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
	Oceanside - I-5 SB On/Off-Ramp		PM	**42.4**	**D**		PM	**55.0**	**D**	Yes
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	**39.8**	**D**	Signalized	AM	**44.8**	**D**	**Yes**
			PM	**65.3**	**E**		PM	**73**	**E**	Yes
54	California - I-5 NB On-Ramp	AWSC	AM	7.6	A	AWSC	AM	7.6	A	No
			PM	7.5	A		PM	7.6	A	No
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	9.2	A	SSSC	AM	9.2	A	No
			PM	9.3	A		PM	9.3	A	No
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	20.4	C	Signalized	AM	18.6	B	No
			PM	25.7	C		PM	31.2	C	No

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. OVF – Overflow, Synchro is unable to calculate a level of delay
F. RBT – Roundabout
G. The minimum acceptable LOS is "D" for intersections 1-47
H. The minimum acceptable LOS is "D"; a change from C or D to a lower LOS will cause an impact for intersections 48-56

The following intersections are identified to generate significant impacts in the future with project conditions:

- Coast Highway & Pier View Way (#6)
- Seagaze Street & Ditmar Street (#15)
- Coast Highway & Wisconsin Boulevard (#21)
- Wisconsin Avenue & Ditmar Street (South) (#24)
- Oceanside Boulevard & Tremont Street (#26)
- Morse Street & Freeman Street (#30)
- Cassidy Street & Freeman Street (#36)
- Vista Way & Ditmar Street (#42)
- Oceanside Boulevard & SB On/Off-Ramp (#52)
- Oceanside Boulevard & NB On/Off-Ramp (#53)

All other intersections are not impacted by the proposed alternative 3.

Mitigation measures are discussed in Section 7.

5.5.3 Vista Way/SR-78 & I-5 Existing Configuration

This section examines traffic conditions with the Coast Highway Corridor project alternative 3 throughout the corridor and assumes existing network conditions for the Vista Way/SR-78 and I-5 Interchange. The analysis was conducted for future (2035) conditions.

5.5.3.1 Road Segment Volumes

Road segment volumes have been included in Appendix A for use in noise modeling purposes. Future road segment volumes are extracted from SANDAG's regional model. In addition to a review of daily ADT volumes, peak hour roadway volumes are also provided for reference in Appendix A. Peak hour roadway volumes can provide a more appropriate depiction of traffic conditions compared with daily roadway capacity.

5.5.3.2 Intersection Level of Service

The intersection operations analysis for the future condition without project was performed consistent with the methodology outlined in Section 3. Table 5-10 presents the results for the future conditions traffic analysis with the proposed project under existing Vista Way/SR-78 & I-5 Interchange configuration. Figure 5-10 contains the traffic volumes used for the future condition analysis.

Table 5-10: LOS Analysis – Future Conditions with Project Alternative 3 (Existing SR-78)

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
1	Coast Highway - I-5 Ramps / Harbor Drive	Signalized	AM	31.1	C	Signalized	AM	29.7	C	No
			PM	**68.9**	**E**		PM	55	D	No
2	Coast Highway - SR-76 Ramps	Signalized	AM	12.7	B	RBT	AM	3	A	No
			PM	25.6	C		PM	17.9	C	No
3	Surfrider Way - Pacific Street	AWSC	AM	10.4	B	AWSC	AM	9.7	A	No
			PM	19.5	C		PM	14.9	B	No
4	Coast Highway - Surfrider Way	Signalized	AM	16.4	B	Signalized	AM	9.7	A	No
			PM	17.1	B		PM	18.1	B	No
5	Coast Highway - Civic Center Drive	Signalized	AM	13.2	B	RBT	AM	7.1	A	No
			PM	15.6	B		PM	28.9	D	No
6	Coast Highway - Pier View Way	Signalized	AM	19.2	B	RBT	AM	7.3	A	No
			PM	8.7	A		PM	**69.4**	**F**	**Yes**
7	Pier View Way - Horne Street	AWSC	AM	9.4	A	AWSC	AM	9	A	No
			PM	17.6	C		PM	13	B	No
8	Mission Avenue - Pacific Street	AWSC	AM	9.5	A	AWSC	AM	9.3	A	No
			PM	19.4	C		PM	18.5	C	No
9	Mission Avenue - Cleveland Street	Signalized	AM	18.8	B	Signalized	AM	12.8	B	No
			PM	17.7	B		PM	14.8	B	No
10	Coast Highway - Mission Avenue	Signalized	AM	12	B	Signalized	AM	14.9	B	No
			PM	12.8	B		PM	28.2	C	No
11	Mission Avenue - Horne Street	Signalized	AM	6.9	A	Signalized	AM	13.2	B	No
			PM	10.7	B		PM	13	B	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
12	Seagaze Street - Tremont Street	SSSC	AM	9.8	A	SSSC	AM	9	A	No
			PM	17.1	C		PM	11.1	B	No
13	Coast Highway - Seagaze Street	Signalized	AM	15.8	B	Signalized	AM	13.3	B	No
			PM	22.7	C		PM	16.1	B	No
14	Seagaze Street - Freeman Street	SSSC	AM	10.1	B	SSSC	AM	10.1	B	No
			PM	15	B		PM	14.7	B	No
15	Seagaze Street - Ditmar Street	AWSC	AM	8.6	A	AWSC	AM	9	A	No
			PM	30.2	D		PM	**51.4**	**F**	**Yes**
16	Seagaze Street - Clementine Street	SSSC	AM	8.3	A	SSSC	AM	8.4	A	No
			PM	17.7	C		PM	16.8	C	No
17	Coast Highway - Missouri Avenue	SSSC	AM	10.8	B	SSSC	AM	9.8	A	No
			PM	15.7	C		PM	12.9	B	No
18	Coast Highway - Washington Avenue	SSSC	AM	9.9	A	RBT	AM	5.6	A	No
			PM	13.8	B		PM	10.8	B	No
19	Wisconsin Avenue - Pacific Street	AWSC	AM	10.1	B	AWSC	AM	9.4	A	No
			PM	**51.3**	**F**		PM	17.1	C	No
20	Wisconsin Avenue - Tremont Street	SSSC	AM	10.8	B	SSSC	AM	12.1	B	No
			PM	14.9	B		PM	22.5	C	No
21	Coast Highway - Wisconsin Avenue	Signalized	AM	14.5	B	RBT	AM	8	A	No
			PM	24.5	C		PM	**40.3**	**E**	**Yes**
22	Wisconsin Avenue - Freeman Street	SSSC	AM	11.5	B	SSSC	AM	11.4	B	No
			PM	19.4	C		PM	16.9	C	No
23	Wisconsin Avenue - Ditmar Street (North)	SSSC	AM	13.2	B	SSSC	AM	14.3	B	No
			PM	17.9	C		PM	23.4	C	No
24	Wisconsin Avenue - Ditmar Street (South)	AWSC	AM	9.5	A	AWSC	AM	10.3	B	No
			PM	23.7	C		PM	**44**	**E**	**Yes**
25	Oceanside Boulevard - Pacific Street	AWSC	AM	9.1	A	AWSC	AM	9	A	No
			PM	12.1	B		PM	11.7	B	No
26	Oceanside Boulevard - Tremont Street	SSSC	AM	14.3	B	SSSC	AM	13.8	B	No
			PM	**91**	**F**		PM	**38.3**	**E**	No
27	Coast Highway - Oceanside Boulevard	Signalized	AM	26.2	C	Signalized	AM	26.6	C	No
			PM	32.1	C		PM	36.2	D	No
28	Oceanside Boulevard - Ditmar Street	Signalized	AM	14.9	B	Signalized	AM	15.1	B	No
			PM	15.3	B		PM	19.1	B	No
29	Coast Highway - Morse Street	Signalized	AM	19.6	B	Signalized	AM	11.7	B	No
			PM	22.9	C		PM	19.9	B	No
30	Morse Street - Freeman Street	SSSC	AM	12.9	B	SSSC	AM	12	B	No
			PM	**112.9**	**F**		PM	**44**	**E**	No
31	Morse Street - Ditmar Street	SSSC	AM	9.5	A	SSSC	AM	9.5	A	No
			PM	11.5	B		PM	11.4	B	No
32	Cassidy Street - Pacific Street	AWSC	AM	8.6	A	AWSC	AM	8.3	A	No
			PM	16.8	C		PM	13.3	B	No
33	Cassidy Street - Broadway Street	SSSC	AM	16	C	SSSC	AM	11.7	B	No
			PM	**397.4**	**F**		PM	29.5	D	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
34	Cassidy Street - Tremont Street	SSSC	AM	10.1	B	SSSC	AM	9.8	A	No
			PM	13.1	B		PM	11.4	B	No
35	Coast Highway - Cassidy Street	Signalized	AM	18.5	B	Signalized	AM	25.4	C	No
			PM	20	C		PM	14.2	B	No
36	Cassidy Street - Freeman Street	SSSC	AM	21.4	C	SSSC	AM	11.9	B	No
			PM	**OVF**	**F**		PM	**52.8**	**F**	No
37	Cassidy Street - Ditmar Street	AWSC	AM	7.6	A	AWSC	AM	7.5	A	No
			PM	8.6	A		PM	8.5	A	No
38	Cassidy Street - Stewart Street	AWSC	AM	9.2	A	AWSC	AM	9.3	A	No
			PM	13.8	B		PM	12.2	B	No
39	Vista Way - Broadway Street	SSSC	AM	8.5	A	SSSC	AM	8.4	A	No
			PM	9.4	A		PM	9.2	A	No
40	Coast Highway - Vista Way	Signalized	AM	32.8	C	Signalized	AM	35.3	D	No
			PM	**78.9**	**E**		PM	52.2	D	No
41	Vista Way - Freeman Street	SSSC	AM	34	D	SSSC	AM	14.5	B	No
			PM	**OVF**	**F**		PM	29.5	D	No
42	Vista Way - Ditmar Street	SSSC	AM	26.2	D	SSSC	AM	18.7	C	No
			PM	**294.2**	**F**		PM	**148.8**	**F**	No
43	Vista Way - Stewart Street	SSSC	AM	22	C	SSSC	AM	16.6	C	No
			PM	**69.1**	**F**		PM	32.8	D	No
44	Coast Highway - Eaton Street	SSSC	AM	14.9	B	SSSC	AM	16.6	C	No
			PM	17.4	C		PM	13.6	B	No
45	Coast Highway - Michigan Avenue	Signalized	AM	4.7	A	RBT	AM	6.5	A	No
			PM	5.4	A		PM	21.2	C	No
46	Coast Highway - West Street	SSSC	AM	9.6	A	RBT	AM	4.5	A	No
			PM	11.2	B		PM	6.2	A	No
47	Coast Highway - Kelly Street	SSSC	AM	10	B	SSSC	AM	10	A	No
			PM	12.7	B		PM	12.8	B	No
48	Harbor/Vandergrift Blvd - I-5 NB On-Ramp/San Rafael Drive	Signalized	AM	15	B	Signalized	AM	16.6	B	No
			PM	37.4	D		PM	44.8	D	No
49	SR-76 - I-5 SB On-Ramp	Signalized	AM	4.9	A	Signalized	AM	4.9	A	No
			PM	4.5	A		PM	4.7	A	No
50	SR-76 - I-5 NB On/Off-Ramp	Signalized	AM	25.4	C	Signalized	AM	19.5	B	No
			PM	27.8	C		PM	**35.6**	**D**	No
51	Mission - I-5 SB Off-Ramp	Signalized	AM	11.6	B	Signalized	AM	11.3	B	No
			PM	13.8	B		PM	13.5	B	No
52	Oceanside - I-5 SB On/Off-Ramp	Signalized	AM	**50.2**	**D**	Signalized	AM	**74**	**E**	**Yes**
			PM	**42.6**	**D**		PM	**52.4**	**D**	**Yes**
53	Oceanside - I-5 NB On/Off-Ramp	Signalized	AM	**37.7**	**D**	Signalized	AM	**42.3**	**D**	Yes
			PM	**65.7**	**E**		PM	**67.1**	**E**	Yes
54	California - I-5 NB On-Ramp	AWSC	AM	7.6	A	AWSC	AM	7.7	A	No
			PM	7.6	A		PM	7.6	A	No
55	Cassidy - I-5 SB On/Off-Ramp	SSSC	AM	9.3	A	SSSC	AM	9.2	A	No
			PM	9.5	A		PM	9.3	A	No

INTERSECTION		FUTURE (2035) WITHOUT PROJECT				FUTURE (2035) WITH PROJECT ALTERNATIVE 3				IMPACT
		TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	TRAFFIC CONTROL	PEAK HOUR	DELAY (S)	LOS	
56	Vista Way - I-5 SB On/Off Ramp	Signalized	AM	25.8	C	Signalized	AM	18.5	B	No
			PM	**88**	**F**		PM	31	C	No

Notes:
A. Delay is expressed as an average seconds of delay per vehicle
B. LOS – Level of Service
C. AWSC – All-way stop control intersection
D. SSSC – Side-street stop control intersection
E. OVF – Overflow, Synchro is unable to calculate a level of delay
F. RBT – Roundabout
G. The minimum acceptable LOS is "D" for intersections 1-47
H. The minimum acceptable LOS is "D"; a change from C or D to a lower LOS will cause an impact for intersections 48-56

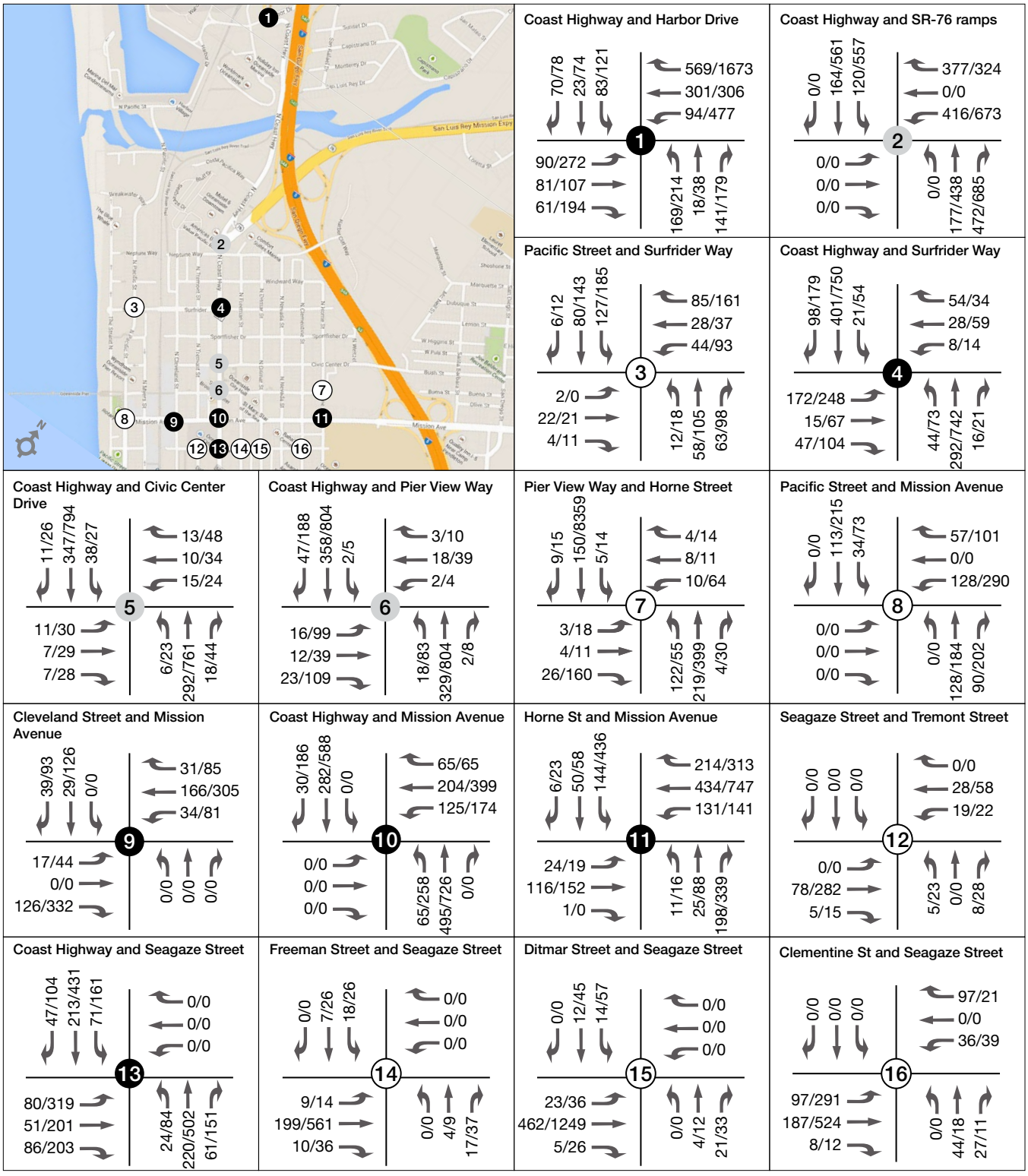
Change in LOS from acceptable LOS D or better to LOS E or F, and therefore significant traffic impacts, are identified for the following intersections for future with project conditions:

- Coast Highway & Pier View Way (#6)
- Seagaze Street & Ditmar Street (#15)
- Coast Highway & Wisconsin Boulevard (#21)
- Wisconsin Avenue & Ditmar Street (South) (#24)
- Oceanside Boulevard & I-5 SB On/Off-Ramp (#52)
- Oceanside Boulevard & I-5 NB On/Off-Ramp (#53)

All other intersections would operate with no anticipated significant impacts during both peak hours with the proposed project alternative 3.

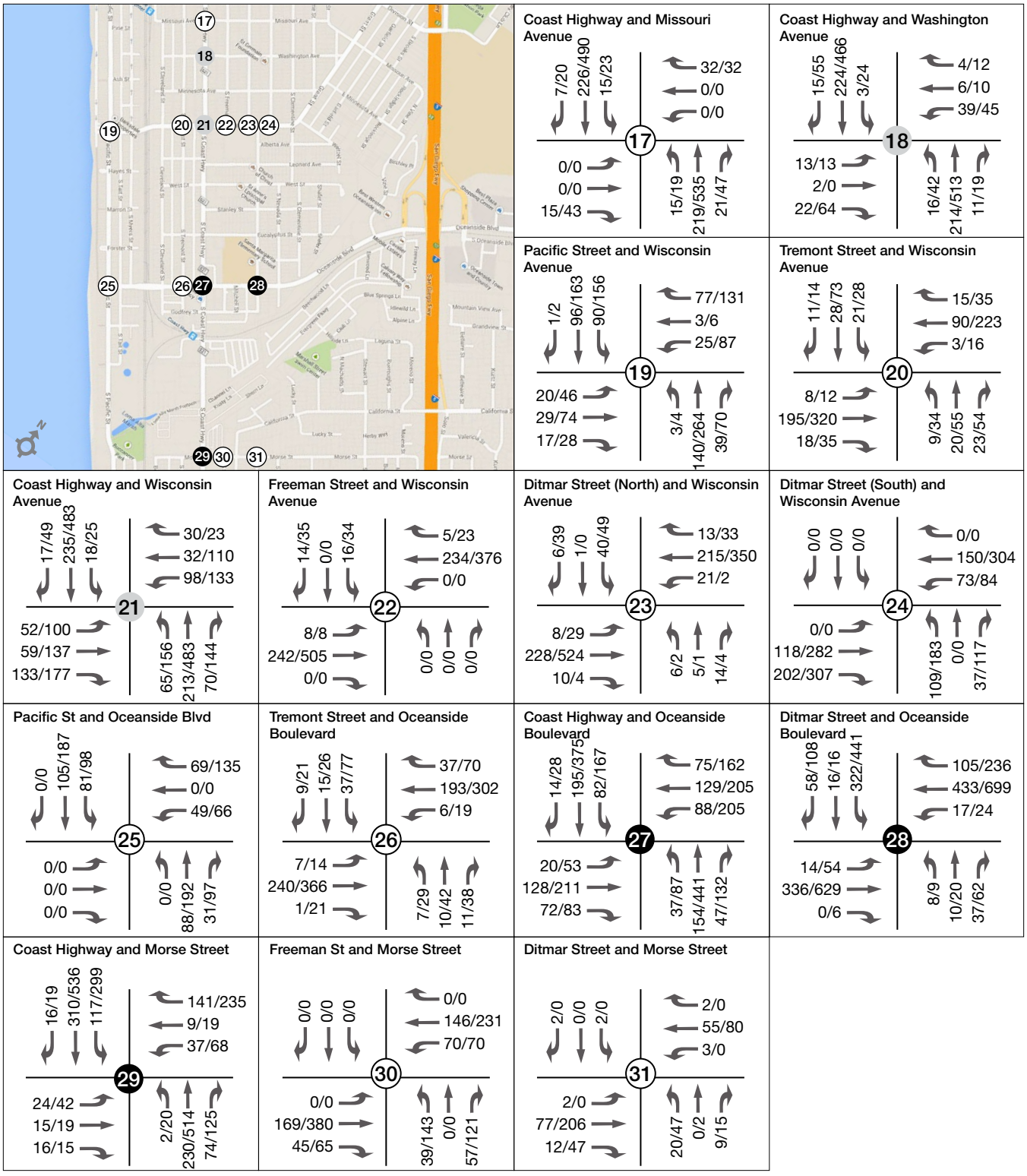
Mitigation measures are discussed in Section 7.

Figure 5-9a Future with Project Alternative 3 Peak Hour Volumes - AM & PM



OCEANSIDE
COAST HIGHWAY
CORRIDOR STUDY

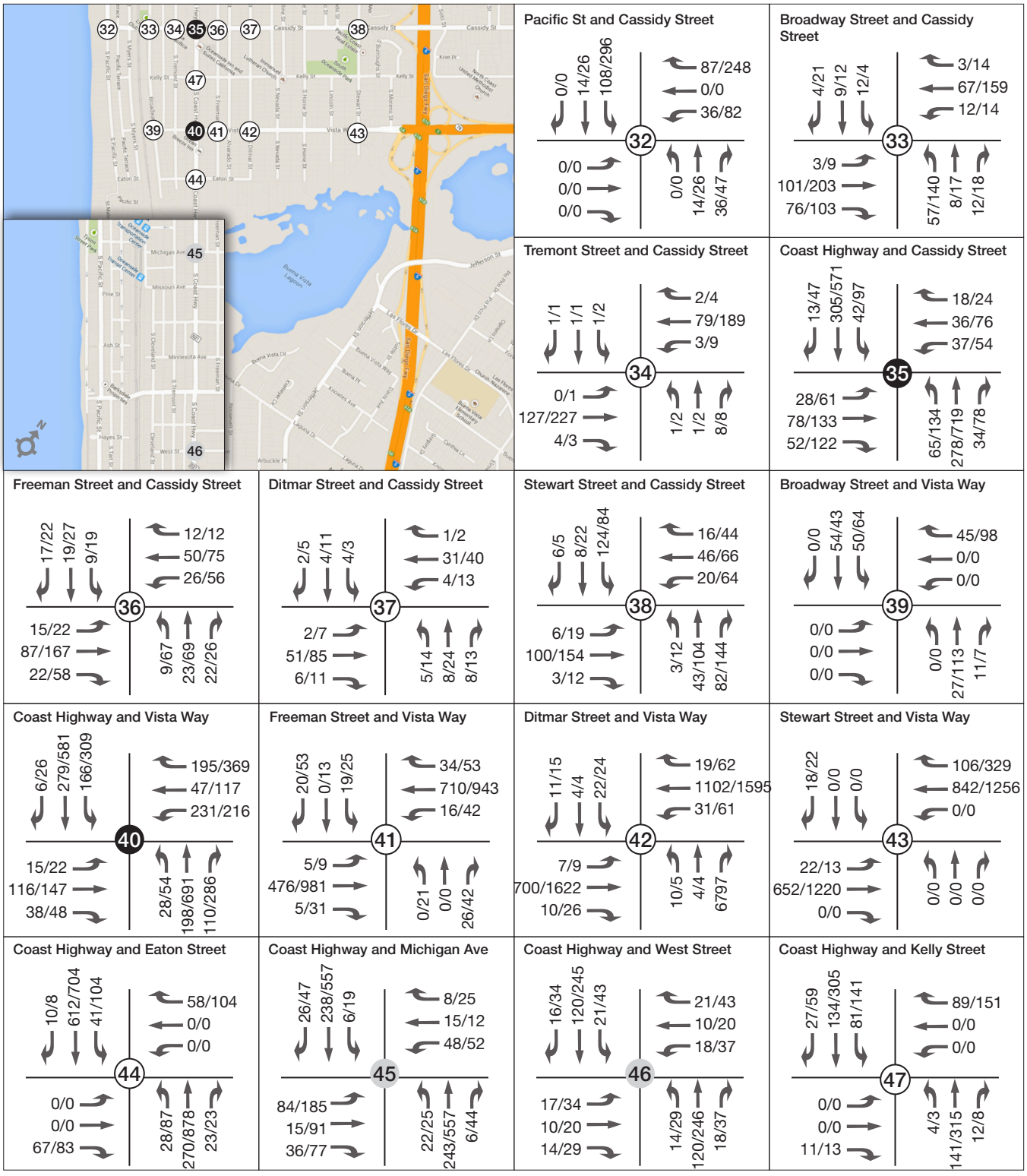
Figure 5-9b Future with Project Alternative 3 Peak Hour Volumes - AM & PM



Legend

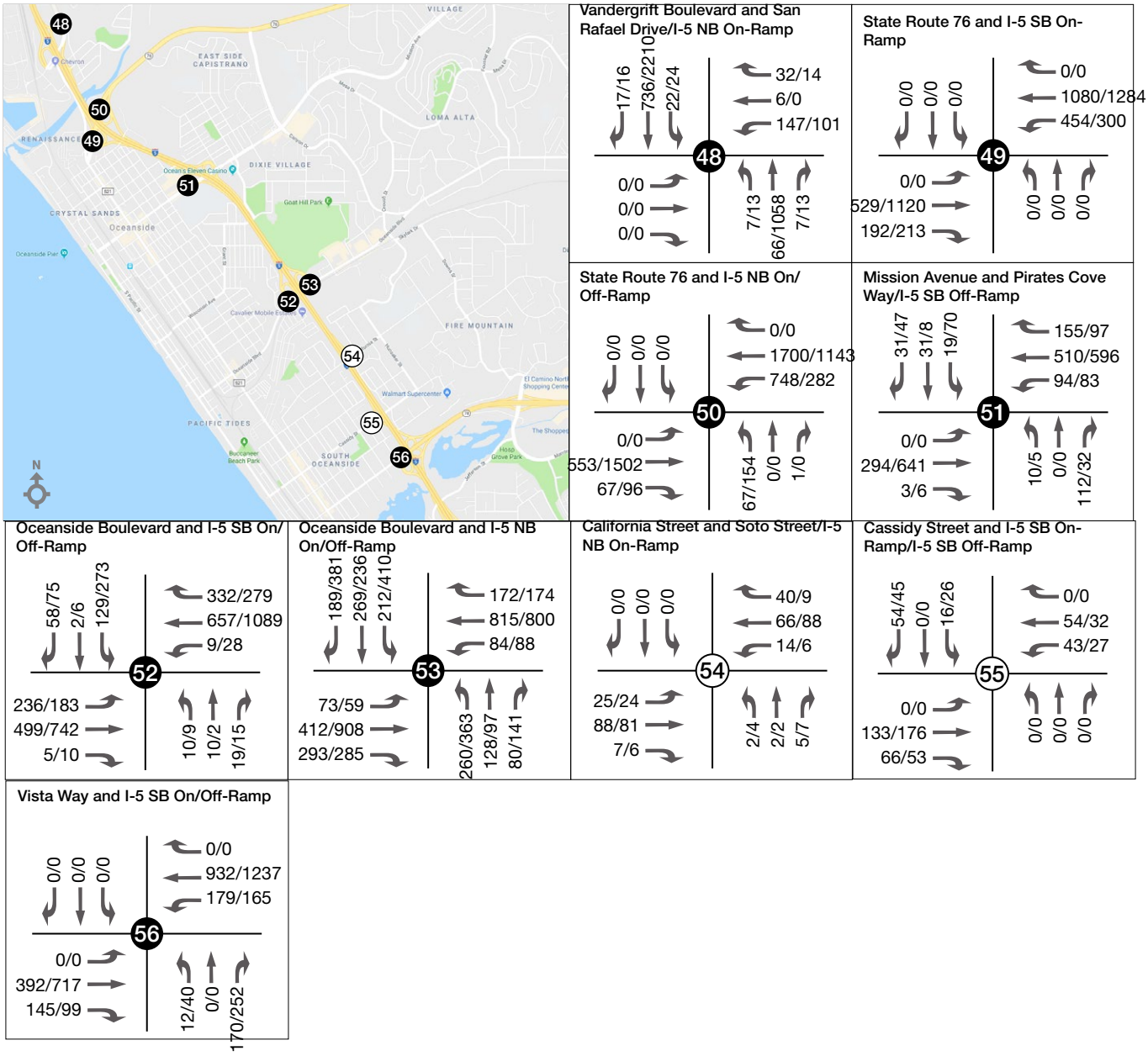
Signalized Intersections Unsignalized Intersections Roundabout Intersections ##/## AM/PM Turning Movement Volume

Figure 5-9c Future with Project Alternative 2 Peak Hour Volumes - AM & PM



OCEANSIDE
COAST HIGHWAY
CORRIDOR STUDY

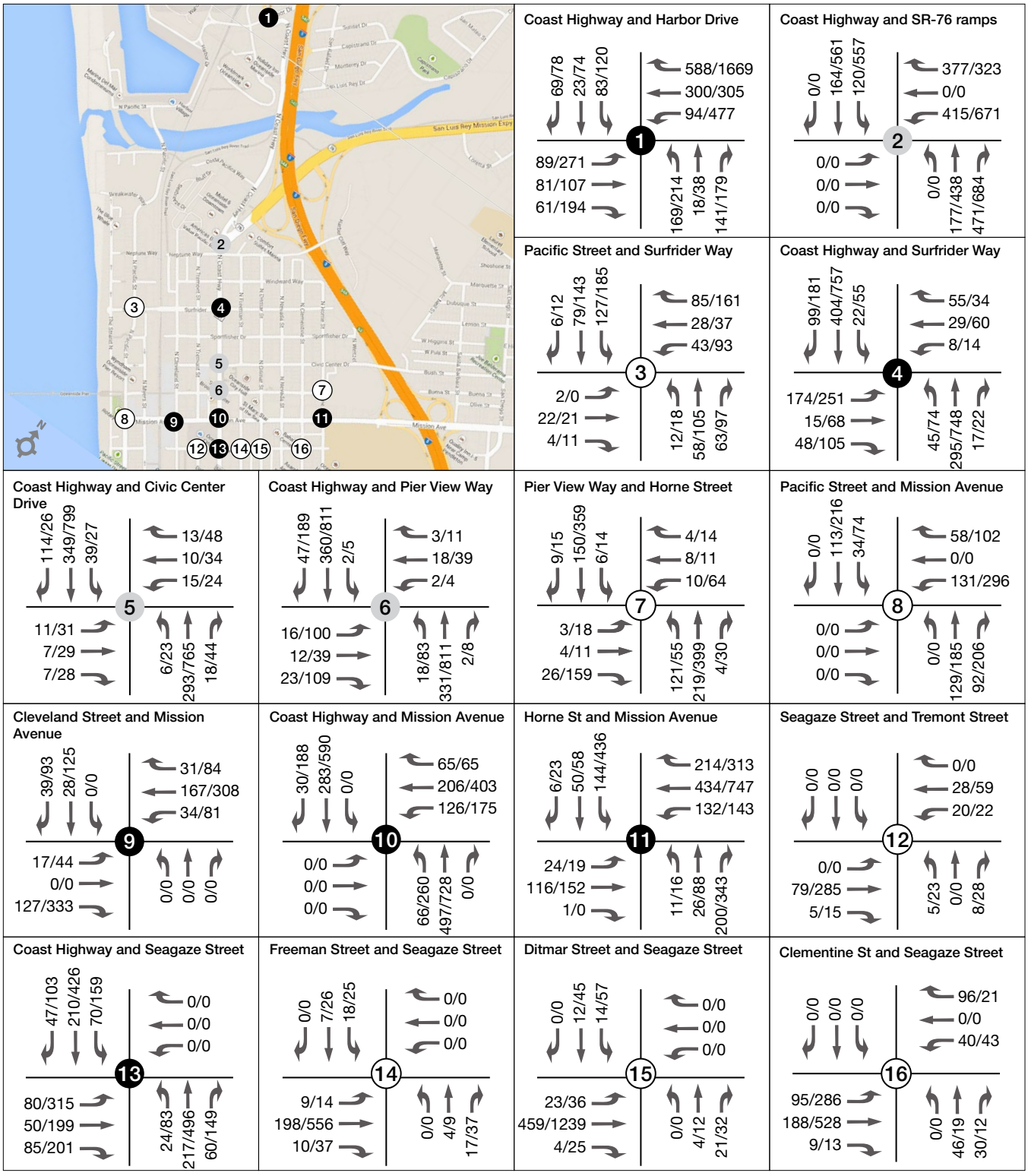
Figure 5-9d Future with Project Alternative 3 Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

Figure 5-10a Future with Project Alternative 3 (Existing SR-78) Peak Hour Volumes - AM & PM

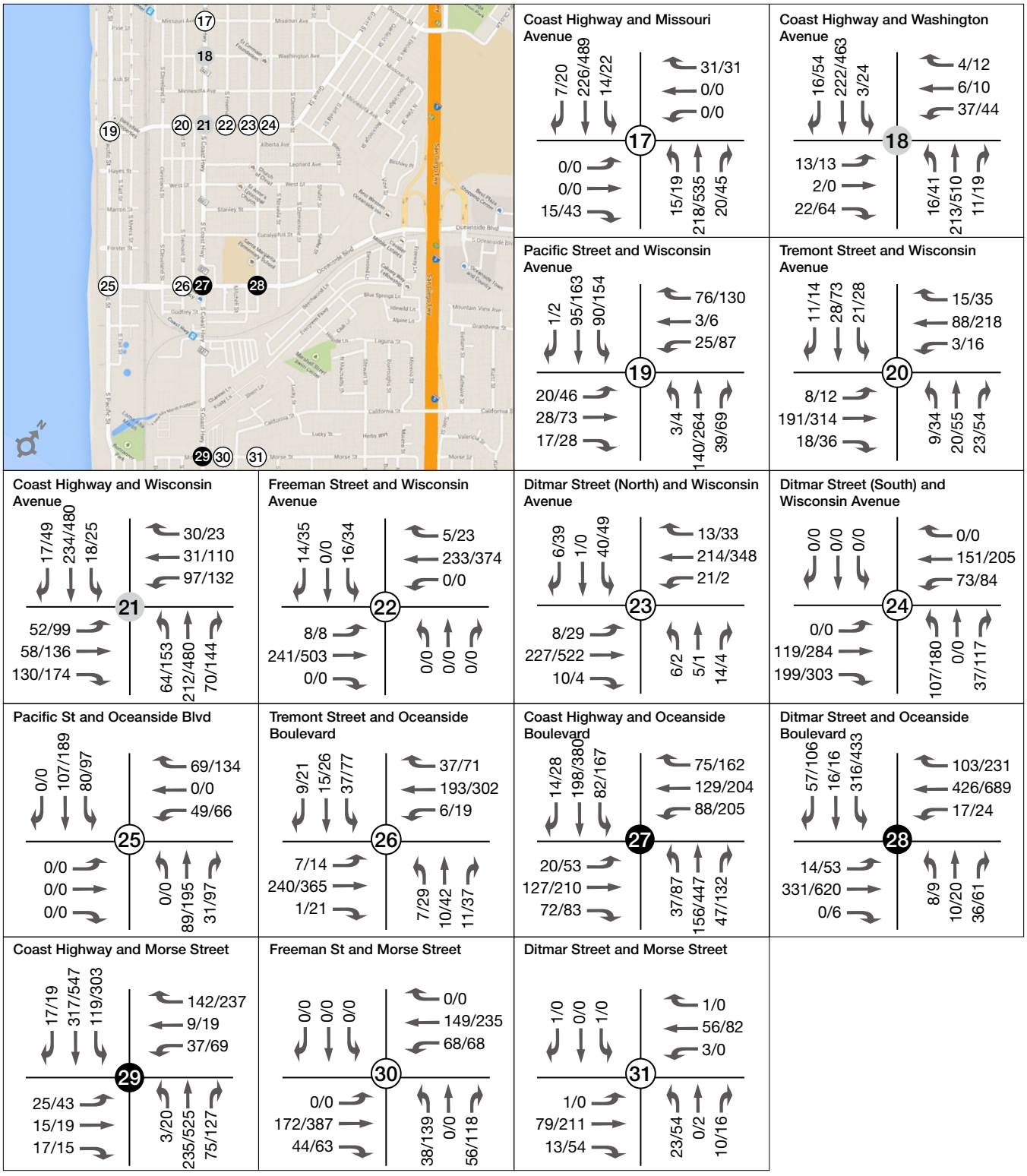


Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

OCEANSIDE COAST HIGHWAY CORRIDOR STUDY

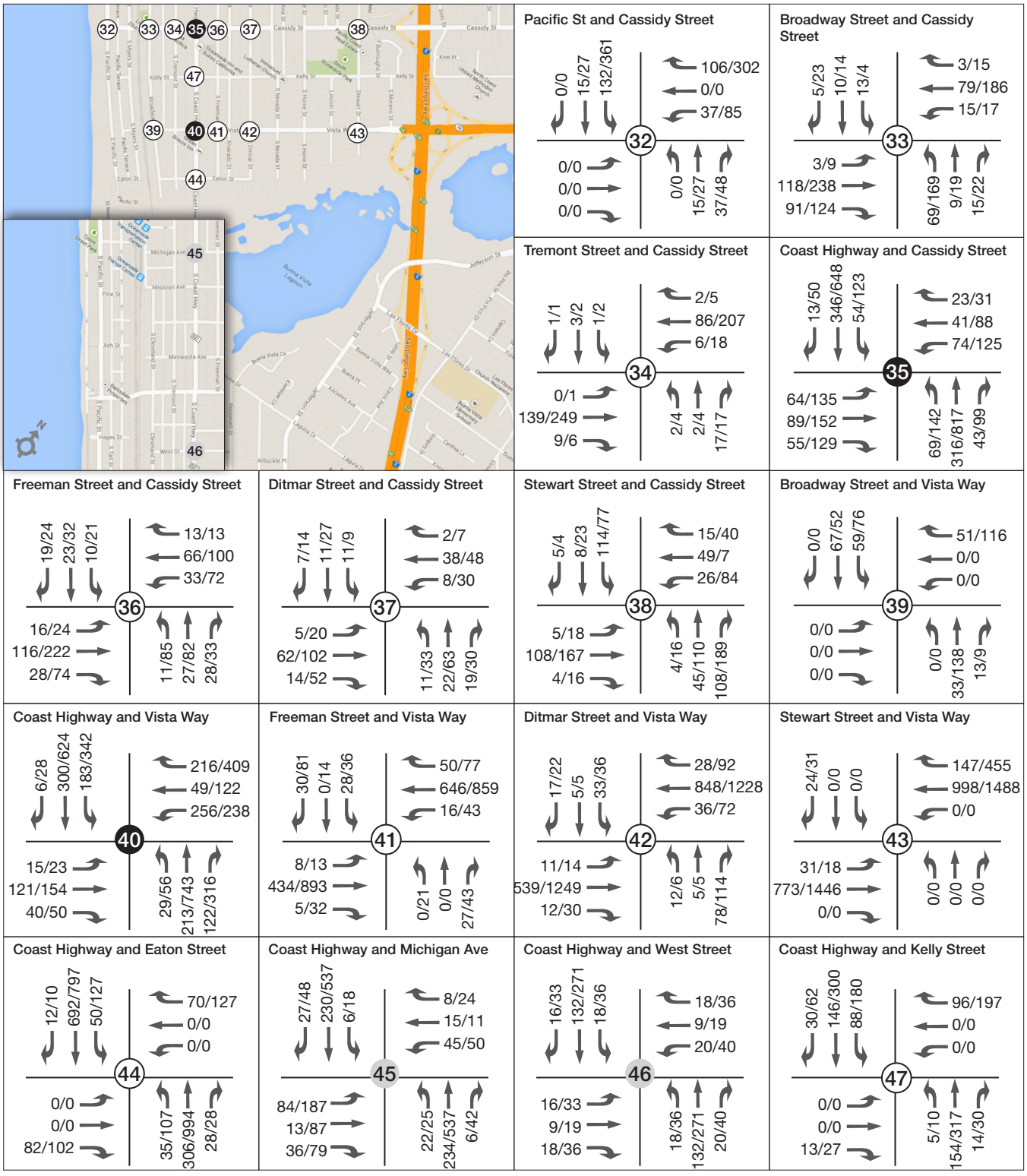
Figure 5-10b Future with Project Alternative 3 (Existing SR-78) Peak Hour Volumes - AM & PM



Legend

● Signalized Intersections ○ Unsignalized Intersections ● Roundabout Intersections ##/## AM/PM Turning Movement Volume

Figure 5-10c Future with Project Alternative 2 (Existing SR-78) Peak Hour Volumes - AM & PM



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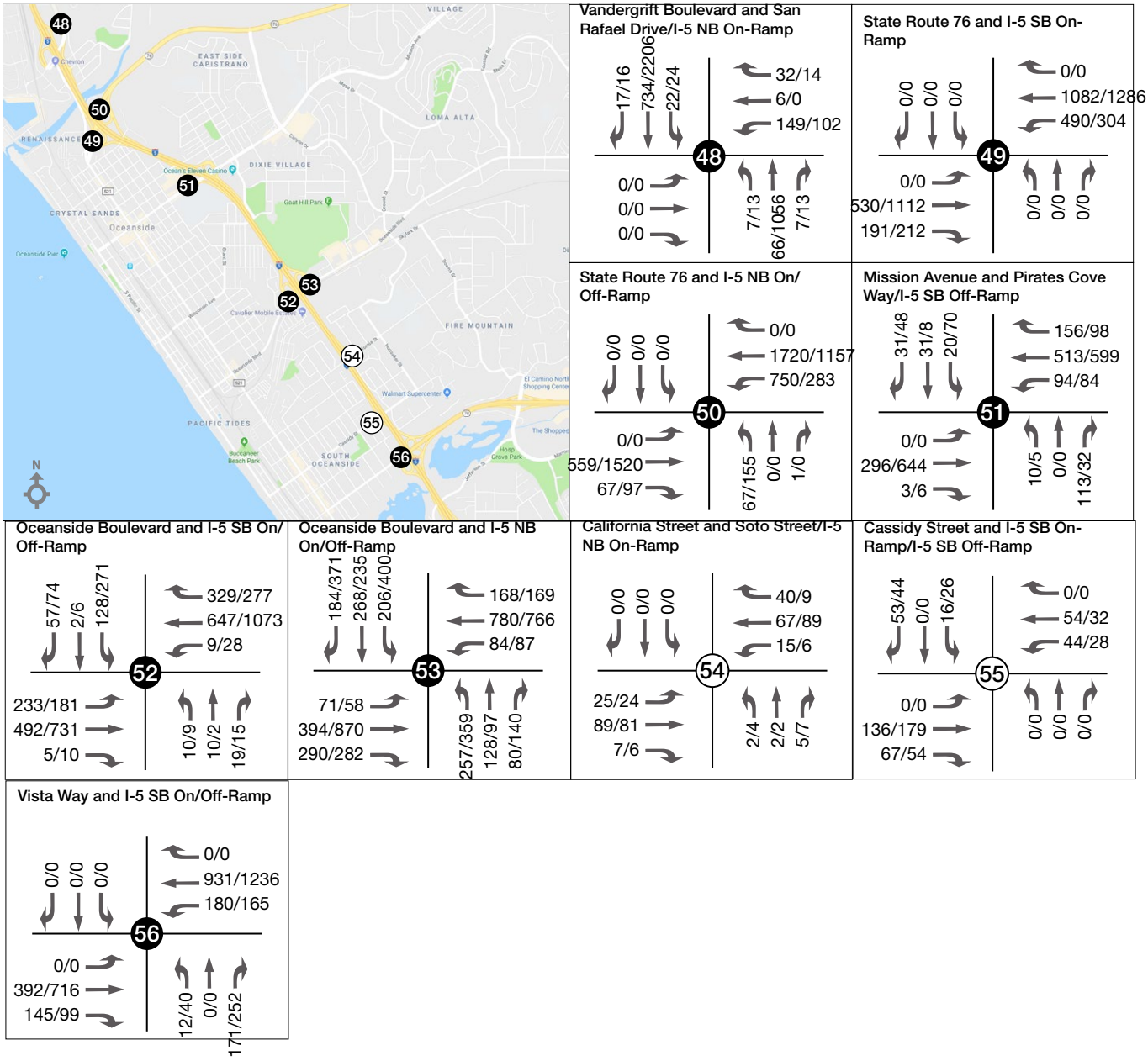
CORRIDOR STUDY

Figure 5-10d Future with Project Alternative 3 (Existing SR-78) Peak Hour Volumes - AM & PM



Legend

Signalized Intersections | Unsignalized Intersections | Roundabout Intersections | ##/## AM/PM Turning Movement Volume

OCEANSIDE COAST HIGHWAY CORRIDOR STUDY

IBI GROUP August 2018

6 Vehicle Miles Traveled Analysis

As discussed in Section 3.4, Senate Bill 743 (SB 743) requires public agencies in the State of California to change how transportation impacts are assessed under the California Environmental Quality Act (CEQA), identifying the use of Vehicle Miles Traveled (VMT) as the primary metric for determining the transportation impact for new development projects. Because new metrics and guidelines in response to SB 743 have not yet been adopted by the State, the VMT analysis in this report is presented for reference purposes only. The traditional intersection level of service analysis presented earlier in this report remains the current metric used by the City of Oceanside to determine transportation impacts under CEQA.

The Governor's Office of Planning and Research (OPR) released the *Revised Proposal on Updates to the CEQA Guidelines on Evaluating Transportation Impacts in CEQA* in January 2016. This document outlines OPR's recommendations regarding methodology for conducting VMT analysis and establishing thresholds for determining significant transportation impacts as part of CEQA analysis for new projects. These recommendations include:

- Vehicle miles traveled is the primary metric for determining transportation impact across the state
- Land use development near transit or in VMT-efficient areas should be presumed to cause a less than significant transportation impact
- Transit, active transportation, and rehabilitation projects that do not add motor vehicle capacity should also be presumed to cause a less than significant impact
- Implementation should be phased in over time

OPR has provided a preliminary recommendation that new development projects be subject to a threshold of generating per capita or per employee VMT fifteen percent below that of existing development. This threshold is consistent with State goals regarding reductions in VMT. Local jurisdictions have the option of adopting more stringent standards for VMT reduction, but as noted above the state has not yet adopted a VMT standard at this time.

The land use changes that would be anticipated to occur with implementation of the Modified Vision Plan land use scenario and the zoning Incentive District included in this traffic analysis could result in development levels above those currently forecast for the corridor by SANDAG in the regional San Diego growth forecast. However, the projected growth beyond the current SANDAG model forecast that could occur under the incentives provided by the zoning Incentive District is consistent with the City's existing General Plan. As well, this increased level of development is consistent with the Coast Highway Vision and Strategic Plan (CHVSP), although the CHVSP is not formally adopted by the City of Oceanside. Importantly, the type of development that is being proposed and incentivized by the zoning Incentive District is consistent with SANDAG's smart growth principles in that the development would provide a mix of uses that help to reduce reliance on automobile trips, reduce VMT, and promote trips using transit and active transportation modes. Further, the roadway changes proposed to Coast Highway to reduce the number of automobile traffic lanes, add bicycle lanes, and improve the active transportation environment would all contribute to reducing VMT within the corridor and the study area.

With these complexities, the VMT analysis has been conducted using the SANDAG regional travel demand model, which considers a variety of factors related to the land use and transportation condition to determine mode of travel choice and VMT. The VMT forecasts used in this analysis were developed for the Existing, Future No Project, Future No Project with the Existing SR-78 configuration, Future with Project, Future with Project with the Existing SR-78 configuration, Future with Project Alternative 3, and Future with Project with the Existing SR-78 configuration scenarios to assess the impact of the potential project in the study area (defined as the portion of the city

between the beach and Interstate 5). Table 6.1 summarizes the per capita VMT forecasts generated using the SANDAG model.

Table 6-1: Vehicle Miles Traveled

Scenario	Forecast Daily VMT per capita	Percentage Change from Existing (Year 2008)
Existing Year 2008 (Model Base Year)	6.56	n/a
Future Year 2035 No Project	7.11	+8%
Future Year 2035 with Project	6.36	-3%
Future Year 2035 with Project Alternative 3	6.63	+1%
Future Year 2035 No Project - Existing SR-78	7.02	+6%
Future Year 2035 with Project - Existing SR-78	6.33	-4%
Future Year 2035 with Project Alternative 3 - Existing SR-78	6.61	+1%

Note: Year 2008 base scenario includes all of the SANDAG region.
Source: SANDAG – Series 12 Regional Growth Forecasts

When comparing the future scenarios at a per capita level (population), the Future No Project 2035 scenario increases VMT by 6 to 8 percent while the Future With Project 2035 scenario decreases VMT by 3 to 4 percent when compared to the baseline Existing Year condition. There is approximately a 1 percent increase for the Future with Project 2035 alternative 3 from the model base year. These results are expected as the project seeks to promote smart growth with strategies such as encouraging and emphasizing multi-modal transportation to increase access and mobility.

The forecast 3 percent reduction in VMT between the Existing (2008 Base Year) and the Future With Project Year 2035 condition does fall short of the 15 percentage reduction target identified in the OPR guidelines. However, the Future With Project condition does help to substantially reduce VMT from the 2008 base year condition and in particular the Baseline Year 2035 scenario. Per the draft OPR guidelines, measures to further reduce project-generated VMT would be focused on strategies that would further reduce or eliminate automobile trips. These strategies could include parking demand management, transportation demand management (promotion of transit use, carpool incentives, etc.), and further improvements to the roadway to promote travel by bicycling and walking.

7 Mitigation

This section identifies mitigation measures in order to achieve acceptable LOS, or restore LOS to a condition equal to the no project scenario. The following mitigation measures would be required to avoid significant project impacts.

7.1 Existing Condition

Analysis results for existing conditions found the project to have two significant impacts and the project alternatives were found to have no significant impact.

7.1.1 Project Scenario

- Coast Highway and Oceanside Boulevard (#27)
- Coast Highway and Cassidy Street (#35)

Table 7-1 provides the project scenario mitigation measures for each intersection. The mitigation measures listed are what would be required for the intersection to operate at an acceptable level of service. In all cases, the significant impact would be the direct result of the proposed project, and as such, the project would be fully responsible for implementation of the mitigation measures.

Table 7-1: Mitigation Measures – Existing with Project

LOCATION		MITIGATION MEASURE	ADDITIONAL COMMENTS	ACTION BY CITY	MITIGATED CONDITIONS	
					DELAY (S)	LOS
27	Coast Hwy & Oceanside Blvd	Maintain Signal	Merging of two lanes to one lane will occur north of intersection before Wisconsin Ave	Incorporate changes to project	41.2	D
35	Coast Hwy & Cassidy St	Maintain Signal	No other adjustments required	Incorporate changes to project	19.2	B

7.1.2 Project Alternative 1 Scenario

No significant impacts are observed with project alternative 1 during both peak hours.

7.1.3 Project Alternative 2 Scenario

No significant impacts are observed with project alternative 2 during both peak hours.

7.1.4 Project Alternative 3 Scenario

No significant impacts are observed with project alternative 3 during both peak hours.

7.2 Future Condition

This section includes analysis results for future conditions that have been impacted in both the Buildout and Existing configurations for the SR-78/I-5 interchange.

7.2.1 Project Scenario

Table 7-2 and Table 7-3 provides the project scenario mitigation measures for each intersection. The mitigation measures listed is what would be required for the intersection to operate at an acceptable level of service. In all cases, the significant impact would be the direct result of the proposed project, and as such, the project would be fully responsible for implementation of the mitigation measures.

Four intersections, Coast Highway & Wisconsin Avenue (#21), Vista Way & Stewart Street (#43), Oceanside & I-5 SB On-/Off-Ramp (#52), and Vista Way & I-5 SB On/Off Ramp (#56) are not mitigatable and would require the city to submit a statement of overriding consideration. The Coast Highway & Wisconsin Avenue intersection could be mitigated by maintaining the existing traffic signal, but it would disrupt the flow of traffic due to the roundabout north of the intersection as well as the adjacent intersections being unsignalized. Therefore, Coast Highway & Wisconsin Avenue will remain a roundabout. The Vista Way & Stewart Street intersection would require lane modification through addition of lanes for mitigation. However, with the recent road diet installed by the city along Vista Way, lane modifications would be inconsistent with the vision and goals of the City. Installation of a traffic signal at this intersection is not feasible due to the close proximity of the signalized intersection of Vista Way with the southbound I-5 ramps.

Table 7-2: Mitigation Measures – Future with Project (Buildout SR-78)

INTERSECTION		MITIGATION MEASURE	FUTURE WITH PROJECT					
			TRAFFIC CONTROL	PEAK HOUR	BUILDOUT SR-78		W/ MITIGATION	
					DELAY (S)	LOS	DELAY (S)	LOS
4	Coast Highway - Surfrider Way	Maintain existing Traffic Signal	RBT	PM	**83.4**	**F**	19.2	B
15	Seagaze Street - Ditmar Street	Convert AWSC to Traffic Signal	AWSC	PM	**55.5**	**F**	13.0	B
21	Coast Highway - Wisconsin Avenue	Not mitigatable	RBT	PM	**49.2**	**E**	N/A	N/A
26	Oceanside Boulevard - Tremont Street	Convert SSSC to AWSC	SSSC	PM	**41.1**	**E**	19.2	C
27	Coast Highway - Oceanside Boulevard	Maintain existing Traffic Signal	RBT	PM	**57.8**	**F**	45.0	D
29	Coast Highway - Morse Street	Maintain existing Traffic Signal	RBT	PM	**71.1**	**F**	20.5	C
35	Coast Highway - Cassidy Street	Maintain existing Traffic Signal	RBT	PM	**249.9**	**F**	51.1	D
40	Coast Highway - Vista Way	Maintain two nb lane configuration	Signalized	PM	**64.2**	**E**	54.2	D
42	Vista Way - Ditmar Street	Convert SSSC to Traffic Signal	SSSC	PM	**585.5**	**F**	11.5	B
43	Vista Way - Stewart Street	Not mitigatable	SSSC	PM	**35.3**	**E**	N/A	N/A

INTERSECTION		MITIGATION MEASURE	FUTURE WITH PROJECT					
			TRAFFIC CONTROL	PEAK HOUR	BUILDOUT SR-78		W/ MITIGATION	
					DELAY (S)	LOS	DELAY (S)	LOS
52	Oceanside – I-5 SB On/Off-Ramp	Not mitigatable	Signalized	AM	**74.5**	**E**	N/A	N/A
52	Oceanside – I-5 SB On/Off-Ramp	Not mitigatable	Signalized	PM	**51.1**	**D**	N/A	N/A
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	AM	**38.7**	**D**	**35.2**	**D**
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	PM	**71.9**	**E**	**55.9**	**E**
56	Vista Way - I-5 SB On/Off Ramp	Not mitigatable	Signalized	PM	**89.9**	**F**	N/A	N/A

Table 7-3: Mitigation Measures – Future with Project (Existing SR-78)

INTERSECTION		MITIGATION MEASURE	FUTURE WITH PROJECT					
			TRAFFIC CONTROL	PEAK HOUR	EXISTING SR-78		W/ MITIGATION	
					DELAY (S)	LOS	DELAY (S)	LOS
4	Coast Highway - Surfrider Way	Maintain existing Traffic Signal	RBT	PM	**71**	**F**	19.6	B
6	Coast Highway - Pier View Way	Maintain existing Traffic Signal	RBT	PM	**46.4**	**E**	8.7	A
15	Seagaze Street - Ditmar Street	Convert AWSC to Traffic Signal	AWSC	PM	**38**	**E**	13.2	B
21	Coast Highway - Wisconsin Avenue	Not mitigatable	RBT	PM	**57.8**	**F**	N/A	N/A
27	Coast Highway - Oceanside Boulevard	Maintain existing Traffic Signal	RBT	PM	**254**	**F**	47.4	D
29	Coast Highway - Morse Street	Maintain existing Traffic Signal	RBT	PM	**134.8**	**F**	25.9	C
35*	Coast Highway - Cassidy Street	Maintain existing Traffic Signal	RBT	PM	**166.3**	**F**	66.4	E
42	Vista Way - Ditmar Street	Convert SSSC to Traffic Signal	SSSC	PM	**--**	**F**	18.3	B
52	Oceanside – I-5 SB On/Off-Ramp	Not mitigatable	Signalized	AM	**74.5**	**E**	N/A	N/A
52	Oceanside – I-5 SB On/Off-Ramp	Not mitigatable	Signalized	PM	**51.1**	**D**	N/A	N/A
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	AM	38.7	D	35.2	D
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	PM	71.9	E	55.6	E
56	Vista Way - I-5 SB On/Off Ramp	Not mitigatable	Signalized	PM	**89.9**	**F**	N/A	N/A

7.2.2 Project Alternative 1 Scenario

Table 7-6 and Table 7-7 provides the project alternative 1 scenario mitigation measures for each intersection. The mitigation measures listed is what would be required for the intersection to operate at an acceptable level of service. In all cases, the significant impact would be the direct result of the proposed project, and as such, the project would be fully responsible for implementation of the mitigation measures.

Four intersections, Coast Highway & Wisconsin Avenue (#21), Vista Way & Stewart Street (#43), Oceanside Boulevard and I-5 SB On/Off-Ramp (#52), and Vista Way & I-5 SB On/Off Ramp (#56) are not mitigatable and would require the city to submit a statement of overriding consideration. The Coast Highway & Wisconsin Avenue intersection could be mitigated by maintaining the existing traffic signal, but it would disrupt the flow of traffic due to the roundabout north of the intersection as well as the adjacent intersections being unsignalized. Therefore, Coast Highway & Wisconsin Avenue will remain a roundabout. The Vista Way & Stewart Street intersection would require lane modification through addition of lanes for mitigation. However, with the recent road diet installed by the city along Vista Way, lane modifications would be inconsistent with the vision and goals of the City. Installation of a traffic signal at this intersection is not feasible due to the close proximity of the signalized intersection of Vista Way with the southbound I-5 ramps.

Table 7-4: Mitigation Measures – Future with Project Alternative 1 (Buildout SR-78)

INTERSECTION		MITIGATION MEASURE	FUTURE WITH PROJECT (ALT 1)					
			TRAFFIC CONTROL	PEAK HOUR	BUILDOUT SR-78		W/ MITIGATION	
					DELAY (S)	LOS	DELAY (S)	LOS
15	Seagaze Street - Ditmar Street	Convert AWSC to Traffic Signal	AWSC	PM	**55.5**	**F**	13.0	B
21	Coast Highway - Wisconsin Avenue	Not mitigatable	RBT	PM	**49.2**	**E**	N/A	N/A
26	Oceanside Boulevard - Tremont Street	Convert SSSC to AWSC	SSSC	PM	**41.1**	**E**	19.2	C
42	Vista Way - Ditmar Street	Convert SSSC to Traffic Signal	SSSC	PM	**472.7**	**F**	11.5	B
43	Vista Way - Stewart Street	Not mitigatable	SSSC	PM	**35.3**	**E**	N/A	N/A
52	Oceanside – I-5 SB On/Off-Ramp	Not mitigatable	Signalized	AM	**75.9**	**E**	N/A	N/A
52	Oceanside – I-5 SB On/Off-Ramp	Not mitigatable	Signalized	PM	**51.1**	**D**	N/A	N/A
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	AM	**40.0**	**D**	**36.5**	**D**
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	PM	**71.9**	**E**	**52.0**	**D**
56	Vista Way - I-5 SB On/Off Ramp	Not mitigatable	Signalized	PM	**89.9**	**F**	N/A	N/A

Table 7-5: Mitigation Measures – Future with Project Alternative 1 (Existing SR-78)

INTERSECTION		MITIGATION MEASURE	FUTURE WITH PROJECT (ALT 1)					
			TRAFFIC CONTROL	PEAK HOUR	EXISTING SR-78		W/ MITIGATION	
					DELAY (S)	LOS	DELAY (S)	LOS
6	Coast Highway - Pier View Way	Maintain existing Traffic Signal	RBT	PM	**46.4**	**E**	8.7	A
15	Seagaze Street - Ditmar Street	Convert AWSC to Traffic Signal	AWSC	PM	**38**	**E**	13.2	B
21	Coast Highway - Wisconsin Avenue	Not mitigatable	RBT	PM	**57.8**	**F**	N/A	N/A
42	Vista Way - Ditmar Street	Convert SSSC to Traffic Signal	SSSC	PM	**--**	**F**	18.3	B
47	Coast Highway - Kelly Street	Convert SSSC to Traffic Signal and restripe eb/wb right turn into a shared left-thru- right	SSSC	PM	**69.4**	**F**	5.8	A
52	Oceanside - I-5 SB On/Off-Ramp	Not mitigatable	Signalized	AM	**75.9**	**E**	N/A	N/A
52	Oceanside - I-5 SB On/Off-Ramp	Not mitigatable	Signalized	PM	**51.1**	**D**	N/A	N/A
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	AM	**40**	**D**	**36.5**	**D**
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	PM	**71.9**	**E**	**55.6**	**E**
56	Vista Way - I-5 SB On/Off Ramp	Not mitigatable	Signalized	PM	**89.9**	**F**	N/A	N/A

7.2.3 Project Alternative 2 Scenario

Table 7-8 and Table 7-9 provides the project alternative 2 scenario mitigation measures for each intersection. The mitigation measures listed is what would be required for the intersection to operate at an acceptable level of service. In all cases, the significant impact would be the direct result of the proposed project, and as such, the project would be fully responsible for implementation of the mitigation measures.

Four intersections, Coast Highway & Wisconsin Avenue (#21), Vista Way & Stewart Street (#43), Oceanside Boulevard and I-5 SB On/Off-Ramp (#52), and Vista Way & I-5 SB On/Off Ramp (#56) are not mitigatable and would require the city to submit a statement of overriding consideration. The Coast Highway & Wisconsin Avenue intersection could be mitigated by maintaining the existing traffic signal, but it would disrupt the flow of traffic due to the roundabout north of the intersection as well as the adjacent intersections being unsignalized. Therefore, Coast Highway & Wisconsin Avenue will remain a roundabout. The Vista Way & Stewart Street intersection would require lane modification through addition of lanes for mitigation. However, with the recent road diet installed by the city along Vista Way, lane modifications would be inconsistent with the vision and goals of the City. Installation of a traffic signal at this intersection is not feasible due to the close proximity of the signalized intersection of Vista Way with the southbound I-5 ramps.

Table 7-6: Mitigation Measures – Future with Project Alternative 2 (Buildout SR-78)

INTERSECTION		MITIGATION MEASURE	FUTURE WITH PROJECT (ALT 2)					
			TRAFFIC CONTROL	PEAK HOUR	BUILDOUT SR-78		W/ MITIGATION	
					DELAY (S)	LOS	DELAY (S)	LOS
15	Seagaze Street - Ditmar Street	Convert AWSC to Traffic Signal	AWSC	PM	**55.5**	**F**	13.0	B
21	Coast Highway - Wisconsin Avenue	Not mitigatable	RBT	PM	**49.2**	**E**	N/A	N/A
26	Oceanside Boulevard - Tremont Street	Convert SSSC to AWSC	SSSC	PM	**41.1**	**E**	19.2	C
42	Vista Way - Ditmar Street	Convert SSSC to Traffic Signal	SSSC	PM	**472.7**	**F**	11.5	B
43	Vista Way - Stewart Street	Not mitigatable	SSSC	PM	**35.3**	**E**	N/A	N/A
52	Oceanside – I-5 SB On/Off-Ramp	Not mitigatable	Signalized	AM	**75.9**	**E**	N/A	N/A
52	Oceanside – I-5 SB On/Off-Ramp	Not mitigatable	Signalized	PM	**51.1**	**D**	N/A	N/A
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	AM	**40.0**	**D**	**36.5**	**D**
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	PM	**71.9**	**E**	**52**	**D**
56	Vista Way - I-5 SB On/Off Ramp	Not mitigatable	Signalized	PM	**89.9**	**F**	N/A	N/A

Table 7-7: Mitigation Measures – Future with Project Alternative 2 (Existing SR-78)

INTERSECTION		MITIGATION MEASURE	FUTURE WITH PROJECT (ALT 2)					
			TRAFFIC CONTROL	PEAK HOUR	EXISTING SR-78		W/ MITIGATION	
					DELAY (S)	LOS	DELAY (S)	LOS
6	Coast Highway - Pier View Way	Maintain existing Traffic Signal	RBT	PM	**46.4**	**E**	8.7	A
15	Seagaze Street - Ditmar Street	Convert AWSC to Traffic Signal	AWSC	PM	**38**	**E**	13.2	B
21	Coast Highway - Wisconsin Avenue	Not mitigatable	RBT	PM	**57.8**	**F**	N/A	N/A
42	Vista Way - Ditmar Street	Convert SSSC to Traffic Signal	SSSC	PM	**--**	**F**	18.3	B
47	Coast Highway - Kelly Street	Convert SSSC to Traffic Signal and restripe eb/wb right turn into a shared left-thru--right	SSSC	PM	**69.4**	**F**	5.8	A
52	Oceanside - I-5 SB On/Off-Ramp	Not mitigatable	Signalized	AM	**73.2**	**E**	N/A	N/A
52	Oceanside - I-5 SB On/Off-Ramp	Not mitigatable	Signalized	PM	**51.1**	**D**	N/A	N/A
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	AM	**40**	**D**	**36.5**	**D**
53	Oceanside – I-5 NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	PM	**71.9**	**D**	**55.6**	**D**
56	Vista Way - I-5 SB On/Off Ramp	Not mitigatable	Signalized	PM	**89.9**	**F**	N/A	N/A

7.2.4 Project Alternative 3 Scenario

Table 7-10 and Table 7-11 provides the project alternative 3 scenario mitigation measures for each intersection. The mitigation measures listed is what would be required for the intersection to operate at an acceptable level of service. In all cases, the significant impact would be the direct result of the proposed project, and as such, the project would be fully responsible for implementation of the mitigation measures.

Three intersections, Coast Highway & Wisconsin Avenue (#21), Wisconsin Avenue & Ditmar Street (#24), and Oceanside Boulevard and I-5 SB On/Off-Ramp (#52) are not mitigatable and would require the city to submit a statement of overriding consideration. The Coast Highway & Wisconsin Avenue intersection could be mitigated by maintaining the existing traffic signal, but it would disrupt the flow of traffic due to the roundabout north of the intersection as well as the adjacent intersections being unsignalized. Therefore, Coast Highway & Wisconsin Avenue will remain a roundabout. The Wisconsin Avenue and Ditmar Street intersection would require the implementation of a traffic signal. The conversion of the intersection into a traffic control will not be realistic due to the location of the intersection as it is in a residential area.

Table 7-8: Mitigation Measures – Future with Project Alternative 3 (Buildout SR-78)

INTERSECTION		MITIGATION MEASURE	FUTURE WITH PROJECT (ALT 3)					
			TRAFFIC CONTROL	PEAK HOUR	BUILDOUT SR-78		W/ MITIGATION	
					DELAY (S)	LOS	DELAY (S)	LOS
6	Coast Highway - Pier View Way	Maintain existing Traffic Signal	RBT	PM	**66.5**	**F**	12.4	B
15	Seagaze Street - Ditmar Street	Convert AWSC to Traffic Signal	AWSC	PM	**53.5**	**F**	7.2	A
21	Coast Highway - Wisconsin Avenue	Not mitigatable	RBT	PM	**42.1**	**E**	N/A	N/A
24	Wisconsin Avenue - Ditmar Street (South)	Not mitigatable	AWSC	PM	**45.3**	**E**	N/A	N/A
26	Oceanside Boulevard - Tremont Street	Convert SSSC to AWSC	SSSC	PM	**38.6**	**E**	18.2	C
30	Morse Street - Freeman Street	Convert SSSC to AWSC	SSSC	PM	**45.4**	**E**	20.1	C
36	Cassidy Street - Freeman Street	Convert SSSC to Traffic Signal	SSSC	PM	**46.5**	**E**	7.8	A
42	Vista Way - Ditmar Street	Convert SSSC to Traffic Signal	SSSC	PM	**165.8**	**F**	10.6	B
52	Oceanside – I-5 SB On/Off-Ramp	Not mitigatable	Signalized	AM	**47.6**	**D**	N/A	N/A
52	Oceanside – I-5 SB On/Off-Ramp	Not mitigatable	Signalized	PM	**55**	**D**	N/A	N/A
53	Oceanside - NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	AM	**44.8**	**D**	**38.5**	**D**
53	Oceanside - NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	PM	**73**	**E**	**52**	**D**

Table 7-9: Mitigation Measures – Future with Project Alternative 3 (Existing SR-78)

INTERSECTION		MITIGATION MEASURE	FUTURE WITH PROJECT (ALT 3)					
			TRAFFIC CONTROL	PEAK HOUR	EXISTING SR-78		W/ MITIGATION	
					DELAY (S)	LOS	DELAY (S)	LOS
6	Coast Highway - Pier View Way	Maintain existing Traffic Signal	RBT	PM	**69.4**	**F**	12.4	B
15	Seagaze Street - Ditmar Street	Convert AWSC to Traffic Signal	AWSC	PM	**51.4**	**F**	7.1	A
21	Coast Highway - Wisconsin Avenue	Not mitigatable	RBT	PM	**40.3**	**E**	N/A	N/A
24	Wisconsin Avenue - Ditmar Street (South)	Not mitigatable	AWSC	PM	**44**	**E**	N/A	N/A
52	Oceanside - I-5 SB On/Off-Ramp	Sb configuration will include two left turn lanes and a shared thru-right lane with a storage length of 100 feet	Signalized	AM	**74**	**E**	N/A	N/A
52	Oceanside - I-5 SB On/Off-Ramp	Sb configuration will include two left turn lanes and a shared thru-right lane with a storage length of 100 feet	Signalized	PM	**52.4**	**D**	N/A	N/A
53	Oceanside - NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	AM	**42.3**	**D**	**37.2**	**D**
53	Oceanside - NB On/Off-Ramp	Modify EB approach to add right-turn pocket (40')	Signalized	PM	**67.1**	**E**	**47.2**	**E**

8 Pedestrian Accessibility

The roadway improvements and modifications proposed as part of the Coast Highway Corridor Study would be designed and constructed consistent with the requirements of the Americans With Disabilities Act (ADA). The project features are intended to increase accessibility and safety for pedestrians throughout the corridor. Traffic calming features such as new mid-block crosswalks, and roundabouts to reduce automobile speeds and conflicts at currently signalized intersections will all contribute to improving pedestrian mobility and safety in the project area.

The city has been requested to specifically assess potential impacts to mobility and safety for blind and visually impaired pedestrians at intersections that are proposed to have roundabouts replace existing traffic signals. To address this concern, the consultant team researched current traffic engineering practices related to roundabout design and research that has been conducted at a national level regarding pedestrian crossings at roundabouts for blind and visually impaired pedestrians.

National Cooperative Highway Research Program (NCHRP) Report 674, Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities, specifically researches and addresses issues with crossing safety at roundabouts for blind and visually impaired pedestrians.

Findings from this report include:

> This research concludes that while some blind research participants had difficulties crossing single-lane roundabouts in a safe manner, these sites appear not to pose crossing difficulties that are beyond those experienced by many blind travelers at similar signalized intersections. The accessibility of single-lane roundabouts seems to be critically linked to:
>
> - Low vehicle speeds at the crosswalk, where reduced vehicle speeds are the result of good geometric design as opposed to driver willingness to reduce speeds due to the possibility of encountering a pedestrian;
> - The willingness of a majority of drivers to yield to pedestrians;
> - Properly installed detectable warning surfaces at all transition points between sidewalk and the street, including the pedestrian splitter island; and
> - Availability of instruction customized to roundabout crossings to explain to pedestrians the intersection geometry and the expected traffic patterns at the crossing.

The report also recommends that specific design features be considered in the roundabout design process to help improve safety for blind and visually impaired pedestrians. These recommendations include:

- Design the roundabout to ensure that vehicles entering the roundabout are restricted to a maximum travel speed of 15 miles per hour.
- Incorporate an audible surface treatment such as a metal plate or rumble strip in the roadway pavement that automobiles would travel over prior to approaching the pedestrian crossing. This feature would provide pedestrians with an audible cue about an approaching vehicle.
- Incorporate a push button activated crossing warning system such as a rectangular rapid flashing beacon (RRFB) at pedestrian crossings that pedestrians would be able to activate to alert drivers to their presence.

- Provide raised crosswalks that improve the visibility of pedestrians and force drivers to reduce their travel speed when entering the roundabout.

The City of Oceanside will evaluate and consider the design features identified above during the design stages of the project development process for the Coast Highway Corridor Study.

9 Parking Inventory

This section identifies the existing on-street public parking resources along both sides of Coast Highway and how these parking resources will alter on a block-by-block basis under the project scenario as well as Alternatives 1, 2, and 3 outlined in Table 9-1 through Table 9-5, respectively. All conditions assume 22 feet per parallel parking space.

Existing parking spaces take into account fire lanes and driveways while the project scenarios only take into account driveways. It was assumed that the existing fire lanes will be changed in the project scenarios due to parking being shown available in those areas. Spaces are added to segments 4 and 5 in the project scenarios due to lanes being converted from two through lanes with no parking to one through lane with a lane for parking and biking. Additionally, available on-street parking spaces in the first half of the corridor reduced due to the roundabouts in the project scenarios.

Table 9-1: Existing Parking Supply

Segment	Block	West Side			East Side			Total
		Parallel	Angled	Temp	Parallel	Angled	Temp	
1	Harbor Dr to SR-76	27	18	0	0	0	0	45
2	SR-76 to Neptune Way	0	0	0	0	0	0	0
	Neptune Way to Windward Way	0	0	0	1	0	0	1
	Windward Way to Surfrider Way	0	0	0	4	0	0	4
	Surfrider Way to Sportfisher Dr	5	0	0	3	0	0	8
	Sportfisher Dr to Civic Center Dr	13	0	0	5	0	4	22
	Civic Center Dr to Pierview Way	9	0	0	9	0	0	18
	Pierview Way to Mission Ave	9	0	0	9	0	0	18
	Mission Ave to Seagaze Dr	0	0	0	0	0	0	0
	Seagaze Dr to Michigan Ave	19	0	0	15	0	0	34
	Michigan Ave to Missouri Ave	12	0	0	15	0	0	27
	Missouri Ave to Washington Ave	13	0	0	13	0	0	26
	Washington Ave to Minnesota Ave	12	0	0	13	0	0	25
	Minnesota Ave to Wisconsin Ave	8	0	0	8	0	0	16
3	Wisconsin Ave to West St	22	0	0	13	0	0	35
	West St to Eucalyptus St	18	0	0	20	0	0	38
	Eucalyptus St to Oceanside Blvd	20	0	0	5	0	0	25
4	Oceanside to Godfrey St	0	0	0	0	0	0	0
	Godfrey St to Morse St	0	0	0	6	0	0	6
5	Morse St to Whaley St	11	0	0	12	0	0	23
	Whaley St to Cassidy St	15	0	0	15	0	0	30
	Cassidy St to Kelly St	11	0	0	10	0	0	21
	Kelly St to Vista Way	9	0	0	12	0	0	21
								443

Table 9-2: With Project Parking Supply

Segment	Block	West Side			East Side			Total
		Street	Angled	Temp	Street	Angled	Temp	
1	Harbor to SR-76	27	18	0	0	0	0	45
2	SR-76 to Neptune Way	0	0	0	0	0	0	0
	Neptune Way to Windward Way	0	0	0	0	0	0	0
	Windward Way to Surfrider Way	0	0	0	0	0	0	0
	Surfrider Way to Sportfisher Dr	3	0	0	3	0	0	6
	Sportfisher Dr to Civic Center Dr	5	0	0	5	0	4	14
	Civic Center Dr to Pierview Way	4	0	0	4	0	0	8
	Pierview Way to Mission Ave	0	0	0	0	0	0	0
	Mission Ave to Seagaze Dr	0	0	0	0	0	0	0
	Seagaze Dr to Michigan Ave	14	0	0	15	0	0	29
	Michigan Ave to Missouri Ave	11	0	0	11	0	0	22
	Missouri Ave to Washington Ave	12	0	0	12	0	0	24
	Washington Ave to Minnesota Ave	12	0	0	12	0	0	24
	Minnesota Ave to Wisconsin Ave	11	0	0	11	0	0	22
3	Wisconsin Ave to West St	15	0	0	7	0	0	22
	West St to Eucalyptus St	18	0	0	8	0	0	26
	Eucalyptus St to Oceanside Blvd	16	0	0	15	0	0	31
4	Oceanside to Godfrey St	1	0	0	3	0	0	4
	Godfrey St to Morse St	40	0	0	48	0	0	88
5	Morse St to Whaley St	14	0	0	13	0	0	27
	Whaley St to Cassidy St	20	0	0	16	0	0	36
	Cassidy St to Kelly St	14	0	0	9	0	0	23
	Kelly St to Vista Way	0	0	0	10	0	0	10
								461

Table 9-3: With Project (Alternative 1) Parking Supply

Segment	Block	West Side			East Side			Total
		Street	Angled	Temp	Street	Angled	Temp	
1	Harbor to SR-76	27	18	0	0	0	0	45
2	SR-76 to Neptune Way	0	0	0	0	0	0	0
	Neptune Way to Windward Way	0	0	0	0	0	0	0
	Windward Way to Surfrider Way	0	0	0	0	0	0	0
	Surfrider Way to Sportfisher Dr	3	0	0	3	0	0	6
	Sportfisher Dr to Civic Center Dr	5	0	0	5	0	4	14
	Civic Center Dr to Pierview Way	4	0	0	4	0	0	8
	Pierview Way to Mission Ave	0	0	0	0	0	0	0
	Mission Ave to Seagaze Dr	0	0	0	0	0	0	0
	Seagaze Dr to Michigan Ave	14	0	0	15	0	0	29
	Michigan Ave to Missouri Ave	11	0	0	11	0	0	22
	Missouri Ave to Washington Ave	12	0	0	12	0	0	24
	Washington Ave to Minnesota Ave	12	0	0	12	0	0	24
	Minnesota Ave to Wisconsin Ave	11	0	0	11	0	0	22
3	Wisconsin Ave to West St	15	0	0	7	0	0	22
	West St to Eucalyptus St	18	0	0	8	0	0	26
	Eucalyptus St to Oceanside Blvd	16	0	0	15	0	0	31
4	Oceanside to Godfrey St	0	0	0	0	0	0	0
	Godfrey St to Morse St	0	0	0	6	0	0	6
5	Morse St to Whaley St	11	0	0	12	0	0	23
	Whaley St to Cassidy St	15	0	0	15	0	0	30
	Cassidy St to Kelly St	11	0	0	10	0	0	21
	Kelly St to Vista Way	9	0	0	12	0	0	21
								374

Table 9-4: With Project (Alternative 2) Parking Supply

Segment	Block	West Side			East Side			Total
		Street	Angled	Temp	Street	Angled	Temp	
1	Harbor to SR-76	27	18	0	0	0	0	45
2	SR-76 to Neptune Way	0	0	0	0	0	0	0
	Neptune Way to Windward Way	0	0	0	0	0	0	0
	Windward Way to Surfrider Way	0	0	0	0	0	0	0
	Surfrider Way to Sportfisher Dr	3	0	0	3	0	0	6
	Sportfisher Dr to Civic Center Dr	5	0	0	5	0	4	14
	Civic Center Dr to Pierview Way	4	0	0	4	0	0	8
	Pierview Way to Mission Ave	0	0	0	0	0	0	0
	Mission Ave to Seagaze Dr	0	0	0	0	0	0	0
	Seagaze Dr to Michigan Ave	14	0	0	15	0	0	29
	Michigan Ave to Missouri Ave	11	0	0	11	0	0	22
	Missouri Ave to Washington Ave	12	0	0	12	0	0	24
	Washington Ave to Minnesota Ave	12	0	0	12	0	0	24
	Minnesota Ave to Wisconsin Ave	11	0	0	11	0	0	22
3	Wisconsin Ave to West St	15	0	0	7	0	0	22
	West St to Eucalyptus St	18	0	0	8	0	0	26
	Eucalyptus St to Oceanside Blvd	16	0	0	15	0	0	31
4	Oceanside to Godfrey St	1	0	0	3	0	0	4
	Godfrey St to Morse St	40	0	0	48	0	0	88
5	Morse St to Whaley St	11	0	0	12	0	0	23
	Whaley St to Cassidy St	15	0	0	15	0	0	30
	Cassidy St to Kelly St	11	0	0	10	0	0	21
	Kelly St to Vista Way	9	0	0	12	0	0	21
								460

Table 9-5: With Project (Alternative 3) Parking Supply

Segment	Block	West Side			East Side			Total
		Street	Angled	Temp	Street	Angled	Temp	
1	Harbor to SR-76	27	18	0	0	0	0	45
2	SR-76 to Neptune Way	0	0	0	0	0	0	0
	Neptune Way to Windward Way	0	0	0	0	0	0	0
	Windward Way to Surfrider Way	0	0	0	0	0	0	0
	Surfrider Way to Sportfisher Dr	3	0	0	3	0	0	6
	Sportfisher Dr to Civic Center Dr	5	0	0	5	0	4	14
	Civic Center Dr to Pierview Way	4	0	0	4	0	0	8
	Pierview Way to Mission Ave	0	0	0	0	0	0	0
	Mission Ave to Seagaze Dr	0	0	0	0	0	0	0
	Seagaze Dr to Michigan Ave	14	0	0	15	0	0	29
	Michigan Ave to Missouri Ave	11	0	0	11	0	0	22
	Missouri Ave to Washington Ave	12	0	0	12	0	0	24
	Washington Ave to Minnesota Ave	12	0	0	12	0	0	24
	Minnesota Ave to Wisconsin Ave	11	0	0	11	0	0	22
3	Wisconsin Ave to West St	15	0	0	7	0	0	22
	West St to Eucalyptus St	18	0	0	8	0	0	26
	Eucalyptus St to Oceanside Blvd	16	0	0	15	0	0	31
4	Oceanside to Godfrey St	1	0	0	3	0	0	4
	Godfrey St to Morse St	40	0	0	48	0	0	88
5	Morse St to Whaley St	11	0	0	12	0	0	23
	Whaley St to Cassidy St	15	0	0	15	0	0	30
	Cassidy St to Kelly St	11	0	0	10	0	0	21
	Kelly St to Vista Way	9	0	0	12	0	0	21
								460

10 Conclusions and Recommendations

The Coast Highway Corridor Study would transform Coast Highway into a Complete Street that accommodates all modes of travel in a safe and efficient manner. Key elements of the project include a continuous Class II striped bicycle lane from Harbor Drive to the South City Limit, a single lane of travel for automobile traffic throughout the corridor (with some segments having a second southbound lane), additional mid-block crosswalks, roundabouts in place of traffic signals where physically feasible, and other enhancements to landscaping.

This TIA report was prepared to assess the potential circulation impacts associated with the Coast Highway Corridor Study. The traffic analysis examined existing year 2013 and future year 2035 conditions without project, with project, and with three project alternatives. Traffic operations were evaluated at study intersections for the AM and PM peak hour for each scenario.

The analysis results indicate the anticipated traffic impacts identified for both the existing and future conditions are mostly mitigatable, resulting in less than significant impacts overall as a result of the project. Only five intersections were found to be un-mitigatable and are recommended for a Statement of Overriding Consideration and are listed below:

- Coast Highway & Wisconsin Avenue (#21)
- Wisconsin Avenue & Ditmar Street (#24)
- Vista Way & Stewart Street (#43)
- Oceanside Boulevard & I-5 SB On/Off-Ramp (#52)
- Vista Way & I-5 SB On/Off Ramp (#56)

The VMT analysis contained in this report shows that forecast VMT for the Future Year 2035 No Project scenarios are approximately +6% to +8% whereas the Future Year 2035 with Project scenarios are forecasted to be around -3% to -4%. The VMT forecasted for the Future Year 2035 with Project alternative 3 scenarios are approximately +1%. The reduction in VMT is expected due to project's purpose of promoting smart growth strategies and multi-modal transportation.

The project will alter the number of parking spaces available along Coast Highway. The project, project alternative 2 and 3 scenarios results in a net positive of approximately 18 parking spaces over existing conditions and the project alternative 1 is the removal of approximately 69 parking spaces.

Further, the project will provide enhanced infrastructure and facilities for bicyclists and pedestrians, making travel along and across Coast Highway safer for these travel modes. The proposed roundabouts are also intended to help improve traffic safety and traffic flow along Coast Highway. Combined with the environmental mitigation measures identified in this report, the project and project alternatives are anticipated to result in positive benefits for mobility in the Coast Highway corridor.

11 Appendices

Appendix A – Roadway Segment Volumes

EXISTING WITHOUT PROJECT

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Existing (2013)	V/C	LOS	Existing (2013)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	9,400	0.627	C	840	0.328	A
	SR-76 Ramps	Civic Center Dr	4U	Secondary Collector	25,000	15,500	0.620	C	1,390	0.271	A
	Civic Center Dr	Seagaze Dr	4U	Secondary Collector	25,000	16,500	0.660	C	1,480	0.289	A
	Seagaze Dr	Wisconsin Ave	4U	Secondary Collector	25,000	15,600	0.624	C	1,400	0.273	A
	Wisconsin Ave	Oceanside Blvd	4U	Secondary Collector	25,000	18,500	0.740	D	1,660	0.324	A
	Oceanside Blvd	Morse St	4TWLT	Secondary Collector	30,000	19,100	0.637	C	1,720	0.336	A
	Morse St	Cassidy St	4U	Secondary Collector	25,000	16,900	0.676	C	1,520	0.297	A
	Cassidy St	Vista Way	4U	Secondary Collector	25,000	18,400	0.736	D	1,660	0.324	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	16,700	0.742	D	1,500	0.391	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	4,600	0.460	B	420	0.164	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	5,200	0.520	B	460	0.180	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	4,100	0.410	B	370	0.145	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	3,600	0.360	A	330	0.129	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	5,800	0.580	C	520	0.203	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	9,400	0.376	B	840	0.164	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	12,400	0.496	B	1,120	0.219	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	2,300	0.230	A	200	0.078	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	1,600	0.160	A	150	0.059	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,100	0.500	A	100	0.039	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	1,200	0.545	A	110	0.043	A
	Cassidy St	Vista Way	2U	Local	2,200	600	0.273	A	50	0.020	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	600	0.273	A	50	0.020	A
	Morse St	Cassidy St	2U	Local	2,200	600	0.273	A	50	0.020	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	800	0.364	A	70	0.027	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	2,500	0.250	A	220	0.086	A
	Morse St	Cassidy St	2U	Local	2,200	500	0.227	A	50	0.020	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	4,700	0.470	B	430	0.168	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	2,300	0.230	A	210	0.082	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	4,500	0.450	B	400	0.156	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	14,500	0.580	C	1,300	0.254	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	1,900	0.190	A	170	0.066	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	2,600	0.260	A	230	0.090	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	4,600	0.460	B	410	0.160	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	4,700	0.470	B	420	0.164	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	2,200	0.220	A	200	0.078	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	16,500	0.733	D	1,480	0.385	A

Notes:
A. #D - Total number of lanes in both directions divided by a raised median
B. #U - Total number of undivided lanes in both directions
C. #TWLT - Total number of lanes in both directions with a center continous two-way left turn lane
D. LOS E capacity is based on criteria estaglished in the City of Oceanside Circulation Element and/or County of San Diego Public Road Standards
E. Peak hour volumes uses HCM 2000 methodology; 9% peak hour factor and 20% volume reduction per lane was assumed (due to posted 25mph signs)
F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

EXISTING WITH PROJECT

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Existing (2013)	V/C	LOS	Existing (2013)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	9,400	0.627	C	840	0.328	A
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	15,500	0.816	E	1,390	0.362	A
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	16,500	0.868	E	1,480	0.578	A
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	15,600	0.821	E	1,400	0.547	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	18,500	0.974	E	1,660	0.648	B
	Oceanside Blvd	Morse St	2TWLT	Collector	15,000	19,100	1.273	F	1,720	0.672	B
	Morse St	Cassidy St	2D	Collector	19,000	16,900	0.889	E	1,520	0.594	A
	Cassidy St	Vista Way	2D	Collector	19,000	18,400	0.968	E	1,660	0.648	B
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	16,700	0.742	D	1,500	0.293	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	4,600	0.460	B	420	0.164	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	5,200	0.520	B	460	0.180	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	4,100	0.410	B	370	0.145	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	3,600	0.360	A	330	0.129	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	5,800	0.580	C	520	0.203	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	9,400	0.376	B	840	0.164	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	12,400	0.496	B	1,120	0.219	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	2,300	0.230	A	200	0.078	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	1,600	0.160	A	150	0.059	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,100	0.500	A	100	0.039	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	1,200	0.545	A	110	0.043	A
	Cassidy St	Vista Way	2U	Local	2,200	600	0.273	A	50	0.020	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	600	0.273	A	50	0.020	A
	Morse St	Cassidy St	2U	Local	2,200	600	0.273	A	50	0.020	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	800	0.364	A	70	0.027	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	2,500	0.250	A	220	0.086	A
	Morse St	Cassidy St	2U	Local	2,200	500	0.227	A	50	0.020	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	4,700	0.470	B	430	0.168	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	2,300	0.230	A	210	0.082	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	4,500	0.450	B	400	0.156	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	14,500	0.580	C	1,300	0.254	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	1,900	0.190	A	170	0.066	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	2,600	0.260	A	230	0.090	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	4,600	0.460	B	410	0.160	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	4,700	0.470	B	420	0.164	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	2,200	0.220	A	200	0.078	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	16,500	0.733	D	1,480	0.385	A

Notes:
A. #D - Total number of lanes in both directions divided by a raised median
B. #U - Total number of undivided lanes in both directions
C. #TWLT - Total number of lanes in both directions with a center continous two-way left turn lane
D. LOS E capacity is based on criteria estaglished in the City of Oceanside Circulation Element and/or County of San Diego Public Road Standards
E. Peak hour volumes uses HCM 2000 methodology; 9% peak hour factor and 20% volume reduction per lane was assumed (due to posted 25mph signs)
F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

EXISTING WITH PROJECT ALTERNATIVE 1

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Existing (2013)	V/C	LOS	Existing (2013)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	9,400	0.627	C	840	0.328	A
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	15,500	0.816	E	1,390	0.543	A
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	16,500	0.868	E	1,480	0.578	A
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	15,600	0.821	E	1,400	0.547	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	18,500	0.974	E	1,660	0.648	B
	Oceanside Blvd	Morse St	4TWLT	Secondary Collector	30,000	19,100	0.637	C	1,720	0.336	A
	Morse St	Cassidy St	4U	Secondary Collector	25,000	16,900	0.676	C	1,520	0.297	A
	Cassidy St	Vista Way	4U	Secondary Collector	25,000	18,400	0.736	D	1,660	0.324	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	16,700	0.742	D	1,500	0.391	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	4,600	0.460	B	420	0.164	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	5,200	0.520	B	460	0.180	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	4,100	0.410	B	370	0.145	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	3,600	0.360	A	330	0.129	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	5,800	0.580	C	520	0.203	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	9,400	0.376	B	840	0.164	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	12,400	0.496	B	1,120	0.219	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	2,300	0.230	A	200	0.078	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	1,600	0.160	A	150	0.059	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,100	0.500	A	100	0.039	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	1,200	0.545	A	110	0.043	A
	Cassidy St	Vista Way	2U	Local	2,200	600	0.273	A	50	0.020	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	600	0.273	A	50	0.020	A
	Morse St	Cassidy St	2U	Local	2,200	600	0.273	A	50	0.020	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	800	0.364	A	70	0.027	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	2,500	0.250	A	220	0.086	A
	Morse St	Cassidy St	2U	Local	2,200	500	0.227	A	50	0.020	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	4,700	0.470	B	430	0.168	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	2,300	0.230	A	210	0.082	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	4,500	0.450	B	400	0.156	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	14,500	0.580	C	1,300	0.254	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	1,900	0.190	A	170	0.066	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	2,600	0.260	A	230	0.090	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	4,600	0.460	B	410	0.160	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	4,700	0.470	B	420	0.164	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	2,200	0.220	A	200	0.078	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	16,500	0.733	D	1,480	0.385	A

Notes:
A. #D - Total number of lanes in both directions divided by a raised median
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E. Peak hour volumes uses HCM 2000 methodology; 9% peak hour factor and 20% volume reduction per lane was assumed (due to posted 25mph signs)
F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

EXISTING WITH PROJECT ALTERNATIVE 2

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Existing (2013)	V/C	LOS	Existing (2013)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	9,400	0.627	C	840	0.328	A
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	15,500	0.816	E	1,390	0.543	A
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	16,500	0.868	E	1,480	0.578	A
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	15,600	0.821	E	1,400	0.547	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	18,500	0.974	E	1,660	0.648	B
	Oceanside Blvd	Morse St	2TWLT	Collector	15,000	19,100	1.273	F	1,720	0.672	B
	Morse St	Cassidy St	4U	Secondary Collector	25,000	16,900	0.676	C	1,520	0.297	A
	Cassidy St	Vista Way	4U	Secondary Collector	25,000	18,400	0.736	D	1,660	0.324	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	16,700	0.742	D	1,500	0.391	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	4,600	0.460	B	420	0.164	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	5,200	0.520	B	460	0.180	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	4,100	0.410	B	370	0.145	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	3,600	0.360	A	330	0.129	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	5,800	0.580	C	520	0.203	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	9,400	0.376	B	840	0.164	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	12,400	0.496	B	1,120	0.219	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	2,300	0.230	A	200	0.078	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	1,600	0.160	A	150	0.059	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,100	0.500	A	100	0.039	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	1,200	0.545	A	110	0.043	A
	Cassidy St	Vista Way	2U	Local	2,200	600	0.273	A	50	0.020	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	600	0.273	A	50	0.020	A
	Morse St	Cassidy St	2U	Local	2,200	600	0.273	A	50	0.020	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	800	0.364	A	70	0.027	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	2,500	0.250	A	220	0.086	A
	Morse St	Cassidy St	2U	Local	2,200	500	0.227	A	50	0.020	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	4,700	0.470	B	430	0.168	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	2,300	0.230	A	210	0.082	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	4,500	0.450	B	400	0.156	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	14,500	0.580	C	1,300	0.254	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	1,900	0.190	A	170	0.066	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	2,600	0.260	A	230	0.090	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	4,600	0.460	B	410	0.160	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	4,700	0.470	B	420	0.164	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	2,200	0.220	A	200	0.078	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	16,500	0.733	D	1,480	0.385	A

Notes:
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E. Peak hour volumes uses HCM 2000 methodology; 9% peak hour factor and 20% volume reduction per lane was assumed (due to posted 25mph signs)
F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

EXISTING WITH PROJECT ALTERNATIVE 3

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Existing (2013)	V/C	LOS	Existing (2013)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	9,400	0.627	C	840	0.328	A
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	15,500	0.816	E	1,390	0.543	A
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	16,500	0.868	E	1,480	0.578	A
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	15,600	0.821	E	1,400	0.547	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	18,500	0.974	E	1,660	0.648	B
	Oceanside Blvd	Morse St	2TWLT	Collector	15,000	19,100	1.273	F	1,720	0.672	B
	Morse St	Cassidy St	4U	Secondary Collector	25,000	16,900	0.676	C	1,520	0.297	A
	Cassidy St	Vista Way	4U	Secondary Collector	25,000	18,400	0.736	D	1,660	0.324	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	16,700	0.742	D	1,500	0.391	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	4,600	0.460	B	420	0.164	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	5,200	0.520	B	460	0.180	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	4,100	0.410	B	370	0.145	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	3,600	0.360	A	330	0.129	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	5,800	0.580	C	520	0.203	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	9,400	0.376	B	840	0.164	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	12,400	0.496	B	1,120	0.219	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	2,300	0.230	A	200	0.078	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	1,600	0.160	A	150	0.059	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,100	0.500	A	100	0.039	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	1,200	0.545	A	110	0.043	A
	Cassidy St	Vista Way	2U	Local	2,200	600	0.273	A	50	0.020	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	600	0.273	A	50	0.020	A
	Morse St	Cassidy St	2U	Local	2,200	600	0.273	A	50	0.020	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	800	0.364	A	70	0.027	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	2,500	0.250	A	220	0.086	A
	Morse St	Cassidy St	2U	Local	2,200	500	0.227	A	50	0.020	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	4,700	0.470	B	430	0.168	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	2,300	0.230	A	210	0.082	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	4,500	0.450	B	400	0.156	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	14,500	0.580	C	1,300	0.254	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	1,900	0.190	A	170	0.066	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	2,600	0.260	A	230	0.090	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	4,600	0.460	B	410	0.160	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	4,700	0.470	B	420	0.164	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	2,200	0.220	A	200	0.078	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	16,500	0.733	D	1,480	0.385	A

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F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

FUTURE WITHOUT PROJECT

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Future (2035)	V/C	LOS	Future (2035)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	17,600	1.173	F	1,580	0.617	B
	SR-76 Ramps	Civic Center Dr	4U	Secondary Collector	25,000	20,400	0.816	D	1,830	0.357	A
	Civic Center Dr	Seagaze Dr	4U	Secondary Collector	25,000	17,500	0.700	C	1,570	0.307	A
	Seagaze Dr	Wisconsin Ave	4U	Secondary Collector	25,000	18,000	0.720	D	1,620	0.316	A
	Wisconsin Ave	Oceanside Blvd	4U	Secondary Collector	25,000	22,700	0.908	E	2,040	0.398	A
	Oceanside Blvd	Morse St	4TWLT	Secondary Collector	30,000	21,500	0.717	D	1,940	0.379	A
	Morse St	Cassidy St	4U	Secondary Collector	25,000	17,500	0.700	C	1,570	0.307	A
	Cassidy St	Vista Way	4U	Secondary Collector	25,000	15,600	0.624	C	1,410	0.275	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	17,200	0.764	D	1,540	0.401	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	11,700	1.170	F	1,050	0.410	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	9,700	0.970	E	880	0.344	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	5,400	0.540	B	490	0.191	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	5,400	0.540	B	490	0.191	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	7,300	0.730	C	660	0.258	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	10,700	0.428	B	960	0.188	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	11,600	0.464	B	1,040	0.203	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	7,300	0.730	C	660	0.258	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	3,500	0.350	A	310	0.121	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,800	0.818	A	160	0.063	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	1,500	0.682	A	130	0.051	A
	Cassidy St	Vista Way	2U	Local	2,200	300	0.136	A	30	0.012	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	400	0.182	A	40	0.016	A
	Morse St	Cassidy St	2U	Local	2,200	2,200	1.000	C	200	0.078	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	900	0.409	A	80	0.031	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	4,300	0.430	B	390	0.152	A
	Morse St	Cassidy St	2U	Local	2,200	1,200	0.545	A	110	0.043	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	6,900	0.690	C	620	0.242	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	2,000	0.200	A	180	0.070	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	6,900	0.690	C	620	0.242	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	17,300	0.692	C	1,550	0.303	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	3,400	0.340	A	310	0.121	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	5,100	0.510	B	460	0.180	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	2,500	0.250	A	230	0.090	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	7,600	0.760	D	690	0.270	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	3,100	0.310	A	280	0.109	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	18,400	0.818	D	1,650	0.430	A

Notes:
A. #D - Total number of lanes in both directions divided by a raised median
B. #U - Total number of undivided lanes in both directions
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D. LOS E capacity is based on criteria estaglished in the City of Oceanside Circulation Element and/or County of San Diego Public Road Standards
E. Peak hour volumes uses HCM 2000 methodology; 9% peak hour factor and 20% volume reduction per lane was assumed (due to posted 25mph signs)
F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

FUTURE WITH PROJECT

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Future (2035)	V/C	LOS	Future (2035)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	21,500	1.433	F	1,940	0.758	C
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	23,300	1.226	F	2,100	0.820	D
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	19,000	1.000	F	1,710	0.668	B
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	13,100	0.689	C	1,180	0.461	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	14,300	0.753	D	1,290	0.504	A
	Oceanside Blvd	Morse St	2TWLT	Collector	15,000	21,400	1.427	F	1,920	0.750	C
	Morse St	Cassidy St	2D	Collector	19,000	18,600	0.979	E	1,670	0.652	B
	Cassidy St	Vista Way	2D	Collector	19,000	14,700	0.774	D	1,320	0.516	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	15,200	0.676	D	1,370	0.268	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	12,500	1.250	F	1,130	0.441	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	10,700	1.070	F	960	0.375	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	6,700	0.670	C	600	0.234	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	7,300	0.730	C	650	0.254	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	9,500	0.950	E	850	0.332	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	11,200	0.448	B	1,010	0.197	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	8,900	0.356	A	800	0.156	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	7,400	0.740	C	670	0.262	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	3,700	0.370	A	330	0.129	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	3,300	1.500	C	290	0.113	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	2,900	1.318	C	260	0.102	A
	Cassidy St	Vista Way	2U	Local	2,200	400	0.182	A	30	0.012	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,000	0.455	A	90	0.035	A
	Morse St	Cassidy St	2U	Local	2,200	2,800	1.273	C	260	0.102	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	700	0.318	A	60	0.023	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	9,500	0.950	E	860	0.336	A
	Morse St	Cassidy St	2U	Local	2,200	1,300	0.591	A	110	0.043	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	8,400	0.840	D	760	0.297	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	7,600	0.760	D	690	0.270	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	9,400	0.940	E	840	0.328	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	14,500	0.580	C	1,310	0.256	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	3,500	0.350	A	310	0.121	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	5,800	0.580	C	520	0.203	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	6,600	0.660	C	600	0.234	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	4,300	0.430	B	390	0.152	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	3,300	0.330	A	300	0.117	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	21,400	0.951	E	1,930	0.503	A

Notes:
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D. LOS E capacity is based on criteria estaglished in the City of Oceanside Circulation Element and/or County of San Diego Public Road Standards
E. Peak hour volumes uses HCM 2000 methodology; 9% peak hour factor and 20% volume reduction per lane was assumed (due to posted 25mph signs)
F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

FUTURE WITH PROJECT EXISTING SR-78

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Future (2035)	V/C	LOS	Future (2035)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	21,800	1.453	F	1,960	0.766	C
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	22,900	1.205	F	2,060	0.805	D
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	18,900	0.995	E	1,700	0.664	B
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	11,400	0.600	B	1,020	0.398	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	15,700	0.826	E	1,410	0.551	A
	Oceanside Blvd	Morse St	2TWLT	Collector	15,000	24,700	1.647	F	2,220	0.867	D
	Morse St	Cassidy St	2D	Collector	19,000	21,100	1.111	F	1,900	0.742	C
	Cassidy St	Vista Way	2D	Collector	19,000	22,600	1.189	F	2,040	0.797	C
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	16,800	0.747	D	1,520	0.297	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	12,600	1.260	F	1,130	0.441	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	9,600	0.960	E	870	0.340	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	7,800	0.780	D	700	0.273	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	8,600	0.860	D	770	0.301	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	9,300	0.930	E	830	0.324	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	10,600	0.424	B	960	0.188	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	8,600	0.344	A	780	0.152	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	6,700	0.670	C	600	0.234	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	3,600	0.360	A	330	0.129	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	3,400	1.545	C	300	0.117	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	3,200	1.455	C	290	0.113	A
	Cassidy St	Vista Way	2U	Local	2,200	500	0.227	A	40	0.016	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,000	0.455	A	90	0.035	A
	Morse St	Cassidy St	2U	Local	2,200	3,100	1.409	C	280	0.109	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	600	0.273	A	60	0.023	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	8,700	0.870	D	780	0.305	A
	Morse St	Cassidy St	2U	Local	2,200	2,100	0.955	A	190	0.074	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	8,500	0.850	D	760	0.297	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	6,500	0.650	C	590	0.230	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	8,900	0.890	D	800	0.313	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	13,800	0.552	C	1,240	0.242	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	4,200	0.420	B	380	0.148	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	6,600	0.660	C	590	0.230	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	6,900	0.690	C	620	0.242	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	5,800	0.580	C	520	0.203	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	3,400	0.340	A	310	0.121	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	37,600	1.671	F	3,380	0.880	D

Notes:
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E. Peak hour volumes uses HCM 2000 methodology; 9% peak hour factor and 20% volume reduction per lane was assumed (due to posted 25mph signs)
F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

FUTURE WITH PROJECT ALTERNATIVE 1

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Future (2035)	V/C	LOS	Future (2035)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	21,500	1.433	F	1,940	0.758	C
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	23,300	1.226	F	2,100	0.820	D
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	19,000	1.000	F	1,710	0.668	B
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	13,100	0.689	C	1,180	0.461	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	14,300	0.753	D	1,290	0.504	A
	Oceanside Blvd	Morse St	4TWLT	Secondary Collector	30,000	21,400	0.713	D	1,920	0.375	A
	Morse St	Cassidy St	4U	Secondary Collector	25,000	18,600	0.744	D	1,670	0.326	A
	Cassidy St	Vista Way	4U	Secondary Collector	25,000	14,700	0.588	C	1,320	0.258	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	15,200	0.676	D	1,370	0.357	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	12,500	1.250	F	1,130	0.441	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	10,700	1.070	F	960	0.375	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	6,700	0.670	C	600	0.234	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	7,300	0.730	C	650	0.254	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	9,500	0.950	E	850	0.332	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	11,200	0.448	B	1,010	0.197	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	8,900	0.356	A	800	0.156	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	7,400	0.740	C	670	0.262	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	3,700	0.370	A	330	0.129	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	3,300	1.500	C	290	0.113	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	2,900	1.318	C	260	0.102	A
	Cassidy St	Vista Way	2U	Local	2,200	400	0.182	A	30	0.012	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,000	0.455	A	90	0.035	A
	Morse St	Cassidy St	2U	Local	2,200	2,800	1.273	C	260	0.102	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	700	0.318	A	60	0.023	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	9,500	0.950	E	860	0.336	A
	Morse St	Cassidy St	2U	Local	2,200	1,300	0.591	A	110	0.043	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	8,400	0.840	D	760	0.297	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	7,600	0.760	D	690	0.270	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	9,400	0.940	E	840	0.328	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	14,500	0.580	C	1,310	0.256	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	3,500	0.350	A	310	0.121	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	5,800	0.580	C	520	0.203	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	6,600	0.660	C	600	0.234	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	4,300	0.430	B	390	0.152	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	3,300	0.330	A	300	0.117	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	21,400	0.951	E	1,930	0.503	A

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E. Peak hour volumes uses HCM 2000 methodology; 9% peak hour factor and 20% volume reduction per lane was assumed (due to posted 25mph signs)
F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

FUTURE WITH PROJECT ALTERNATIVE 1 EXISTING SR-78

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Future (2035)	V/C	LOS	Future (2035)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	21,800	1.453	F	1,960	0.766	C
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	22,900	1.205	F	2,060	0.805	D
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	18,900	0.995	E	1,700	0.664	B
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	11,400	0.600	B	1,020	0.398	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	15,700	0.826	E	1,410	0.551	A
	Oceanside Blvd	Morse St	4TWLT	Secondary Collector	30,000	24,700	0.823	D	2,220	0.434	A
	Morse St	Cassidy St	4U	Secondary Collector	25,000	21,100	0.844	D	1,900	0.371	A
	Cassidy St	Vista Way	4U	Secondary Collector	25,000	22,600	0.904	E	2,040	0.398	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	16,800	0.747	D	1,520	0.396	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	12,600	1.260	F	1,130	0.441	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	9,600	0.960	E	870	0.340	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	7,800	0.780	D	700	0.273	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	8,600	0.860	D	770	0.301	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	9,300	0.930	E	830	0.324	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	10,600	0.424	B	960	0.188	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	8,600	0.344	A	780	0.152	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	6,700	0.670	C	600	0.234	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	3,600	0.360	A	330	0.129	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	3,400	1.545	C	300	0.117	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	3,200	1.455	C	290	0.113	A
	Cassidy St	Vista Way	2U	Local	2,200	500	0.227	A	40	0.016	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,000	0.455	A	90	0.035	A
	Morse St	Cassidy St	2U	Local	2,200	3,100	1.409	C	280	0.109	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	600	0.273	A	60	0.023	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	8,700	0.870	D	780	0.305	A
	Morse St	Cassidy St	2U	Local	2,200	2,100	0.955	A	190	0.074	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	8,500	0.850	D	760	0.297	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	6,500	0.650	C	590	0.230	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	8,900	0.890	D	800	0.313	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	13,800	0.552	C	1,240	0.242	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	4,200	0.420	B	380	0.148	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	6,600	0.660	C	590	0.230	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	6,900	0.690	C	620	0.242	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	5,800	0.580	C	520	0.203	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	3,400	0.340	A	310	0.121	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	37,600	1.671	F	3,380	0.880	D

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F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

FUTURE WITH PROJECT ALTERNATIVE 2

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Future (2035)	V/C	LOS	Future (2035)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	21,500	1.433	F	1,940	0.758	C
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	23,300	1.226	F	2,100	0.820	D
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	19,000	1.000	F	1,710	0.668	B
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	13,100	0.689	C	1,180	0.461	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	14,300	0.753	D	1,290	0.504	A
	Oceanside Blvd	Morse St	2TWLT	Collector	15,000	21,400	1.427	F	1,920	0.750	C
	Morse St	Cassidy St	4U	Secondary Collector	25,000	18,600	0.744	D	1,670	0.326	A
	Cassidy St	Vista Way	4U	Secondary Collector	25,000	14,700	0.588	C	1,320	0.258	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	15,200	0.676	D	1,370	0.357	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	12,500	1.250	F	1,130	0.441	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	10,700	1.070	F	960	0.375	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	6,700	0.670	C	600	0.234	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	7,300	0.730	C	650	0.254	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	9,500	0.950	E	850	0.332	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	11,200	0.448	B	1,010	0.197	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	8,900	0.356	A	800	0.156	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	7,400	0.740	C	670	0.262	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	3,700	0.370	A	330	0.129	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	3,300	1.500	C	290	0.113	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	2,900	1.318	C	260	0.102	A
	Cassidy St	Vista Way	2U	Local	2,200	400	0.182	A	30	0.012	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,000	0.455	A	90	0.035	A
	Morse St	Cassidy St	2U	Local	2,200	2,800	1.273	C	260	0.102	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	700	0.318	A	60	0.023	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	9,500	0.950	E	860	0.336	A
	Morse St	Cassidy St	2U	Local	2,200	1,300	0.591	A	110	0.043	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	8,400	0.840	D	760	0.297	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	7,600	0.760	D	690	0.270	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	9,400	0.940	E	840	0.328	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	14,500	0.580	C	1,310	0.256	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	3,500	0.350	A	310	0.121	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	5,800	0.580	C	520	0.203	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	6,600	0.660	C	600	0.234	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	4,300	0.430	B	390	0.152	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	3,300	0.330	A	300	0.117	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	21,400	0.951	E	1,930	0.503	A

Notes:
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D. LOS E capacity is based on criteria estaglished in the City of Oceanside Circulation Element and/or County of San Diego Public Road Standards
E. Peak hour volumes uses HCM 2000 methodology; 9% peak hour factor and 20% volume reduction per lane was assumed (due to posted 25mph signs)
F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

FUTURE WITH PROJECT ALTERNATIVE 2 EXISTING SR-78

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Future (2035)	V/C	LOS	Future (2035)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	21,800	1.453	F	1,960	0.766	C
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	22,900	1.205	F	2,060	0.805	D
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	18,900	0.995	E	1,700	0.664	B
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	11,400	0.600	B	1,020	0.398	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	15,700	0.826	E	1,410	0.551	A
	Oceanside Blvd	Morse St	2TWLT	Collector	19,000	24,700	1.300	F	2,220	0.867	D
	Morse St	Cassidy St	4U	Secondary Collector	25,000	21,100	0.844	D	1,900	0.371	A
	Cassidy St	Vista Way	4U	Secondary Collector	25,000	22,600	0.904	E	2,040	0.398	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	16,800	0.747	D	1,520	0.396	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	12,600	1.260	F	1,130	0.441	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	9,600	0.960	E	870	0.340	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	7,800	0.780	D	700	0.273	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	8,600	0.860	D	770	0.301	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	9,300	0.930	E	830	0.324	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	10,600	0.424	B	960	0.188	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	8,600	0.344	A	780	0.152	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	6,700	0.670	C	600	0.234	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	3,600	0.360	A	330	0.129	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	3,400	1.545	C	300	0.117	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	3,200	1.455	C	290	0.113	A
	Cassidy St	Vista Way	2U	Local	2,200	500	0.227	A	40	0.016	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,000	0.455	A	90	0.035	A
	Morse St	Cassidy St	2U	Local	2,200	3,100	1.409	C	280	0.109	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	600	0.273	A	60	0.023	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	8,700	0.870	D	780	0.305	A
	Morse St	Cassidy St	2U	Local	2,200	2,100	0.955	A	190	0.074	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	8,500	0.850	D	760	0.297	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	6,500	0.650	C	590	0.230	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	8,900	0.890	D	800	0.313	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	13,800	0.552	C	1,240	0.242	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	4,200	0.420	B	380	0.148	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	6,600	0.660	C	590	0.230	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	6,900	0.690	C	620	0.242	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	5,800	0.580	C	520	0.203	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	3,400	0.340	A	310	0.121	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	37,600	1.671	F	3,380	0.880	D

Notes:
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E. Peak hour volumes uses HCM 2000 methodology; 9% peak hour factor and 20% volume reduction per lane was assumed (due to posted 25mph signs)
F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

FUTURE WITH PROJECT ALTERNATIVE 3

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Future (2035)	V/C	LOS	Future (2035)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	21,400	1.427	F	1,930	0.754	C
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	23,100	1.216	F	2,080	0.813	D
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	19,600	1.032	F	1,760	0.688	B
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	10,900	0.574	B	980	0.383	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	11,800	0.621	C	1,060	0.414	A
	Oceanside Blvd	Morse St	2TWLT	Secondary Collector	15,000	17,500	1.167	F	1,570	0.613	B
	Morse St	Cassidy St	4U	Secondary Collector	25,000	11,300	0.452	B	1,020	0.199	A
	Cassidy St	Vista Way	4U	Secondary Collector	25,000	10,800	0.432	B	970	0.189	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	14,200	0.631	C	1,280	0.333	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	12,600	1.260	F	1,130	0.441	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	10,600	1.060	F	950	0.371	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	7,000	0.700	C	630	0.246	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	7,500	0.750	D	670	0.262	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	9,400	0.940	E	850	0.332	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	11,300	0.452	B	1,010	0.197	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	8,000	0.320	A	720	0.141	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	7,300	0.730	C	660	0.258	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	3,500	0.350	A	310	0.121	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	3,000	1.364	C	270	0.105	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	2,700	1.227	C	240	0.094	A
	Cassidy St	Vista Way	2U	Local	2,200	1,300	0.591	A	120	0.047	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,000	0.455	A	90	0.035	A
	Morse St	Cassidy St	2U	Local	2,200	5,600	2.545	C	500	0.195	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	800	0.364	A	70	0.027	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	11,600	1.160	F	1,040	0.406	A
	Morse St	Cassidy St	2U	Local	2,200	1,500	0.682	A	140	0.055	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	7,900	0.790	D	710	0.277	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	8,400	0.840	D	760	0.297	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	9,200	0.920	E	830	0.324	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	13,100	0.524	C	1,180	0.230	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	5,600	0.560	C	500	0.195	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	8,200	0.820	D	740	0.289	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	3,200	0.320	A	280	0.109	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	4,400	0.440	B	390	0.152	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	4,000	0.400	B	360	0.141	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	30,800	1.369	F	2,770	0.721	C

Notes:
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E. Peak hour volumes uses HCM 2000 methodology; 9% peak hour factor and 20% volume reduction per lane was assumed (due to posted 25mph signs)
F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

FUTURE WITH PROJECT ALTERNATIVE 3 EXISTING SR-78

Street Segment	From	To	Lanes	Classification	LOS E Capacity	Average Daily Traffic (ADT)			Peak Hour		
						Future (2035)	V/C	LOS	Future (2035)	V/C	LOS
Coast Hwy	Harbor Dr	SR-76 Ramps	2TWLT	Collector	15,000	21,400	1.427	F	1,930	0.754	C
	SR-76 Ramps	Civic Center Dr	3TWLT/2D	Collector	19,000	23,300	1.226	F	2,100	0.820	D
	Civic Center Dr	Seagaze Dr	2D	Collector	19,000	19,700	1.037	F	1,770	0.691	B
	Seagaze Dr	Wisconsin Ave	2D	Collector	19,000	10,800	0.568	B	980	0.383	A
	Wisconsin Ave	Oceanside Blvd	2D	Collector	19,000	11,800	0.621	C	1,060	0.414	A
	Oceanside Blvd	Morse St	2TWLT	Collector	15,000	17,800	1.187	F	1,600	0.625	B
	Morse St	Cassidy St	4U	Secondary Collector	25,000	11,600	0.464	B	1,040	0.203	A
	Cassidy St	Vista Way	4U	Secondary Collector	25,000	11,000	0.440	B	990	0.193	A
	Vista Way	Southern City Limits	3TWLT	Secondary Collector	22,500	14,600	0.649	C	1,320	0.344	A
Pacific St	Surfrider Way	Seagaze Dr	2U	Collector	10,000	12,700	1.270	F	1,150	0.449	A
	Seagaze Dr	Wisconsin Ave	2U	Collector	10,000	10,500	1.050	F	950	0.371	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	7,000	0.700	C	630	0.246	A
	Oceanside Blvd	Cassidy St	2U	Collector	10,000	7,600	0.760	D	680	0.266	A
Surfrider Way	Pacific St	Coast Hwy	2D	Collector	10,000	9,500	0.950	E	860	0.336	A
Mission Ave	Pacific St	Coast Hwy	4U	Secondary Collector	25,000	11,300	0.452	B	1,020	0.199	A
	Coast Hwy	Clementine St	4U	Secondary Collector	25,000	8,100	0.324	A	730	0.143	A
Seagaze St	Coast Hwy	Clementine St	2U	Collector	10,000	7,200	0.720	C	650	0.254	A
Cleveland St	Civic Center Dr	Mission Ave	2U	Collector	10,000	3,400	0.340	A	310	0.121	A
Tremont St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	3,000	1.364	C	270	0.105	A
	Wisconsin Ave	Oceanside Blvd	2U	Local	2,200	2,700	1.227	C	240	0.094	A
	Cassidy St	Vista Way	2U	Local	2,200	1,600	0.727	A	140	0.055	A
Freeman St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	1,000	0.455	A	90	0.035	A
	Morse St	Cassidy St	2U	Local	2,200	5,400	2.455	C	480	0.188	A
Ditmar St	Michigan Ave	Wisconsin Ave	2U	Local	2,200	800	0.364	A	70	0.027	A
	Wisconsin Ave	Oceanside Blvd	2U	Collector	10,000	11,400	1.140	F	1,030	0.402	A
	Morse St	Cassidy St	2U	Local	2,200	1,800	0.818	A	160	0.063	A
Wisconsin Ave	Cleveland	Coast Hwy	2U	Collector	10,000	7,700	0.770	D	700	0.273	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	8,400	0.840	D	760	0.297	A
Oceanside Blvd	Cleveland	Coast Hwy	2U	Collector	10,000	9,200	0.920	E	830	0.324	A
	Coast Hwy	Ditmar St	4U	Secondary Collector	25,000	13,000	0.520	C	1,170	0.229	A
Broadway St	Cassidy St	Vista Way	2U	Collector	10,000	5,800	0.580	C	520	0.203	A
Morse St	Coast Hwy	Ditmar St	2U	Collector	10,000	8,500	0.850	D	760	0.297	A
Cassidy St	Broadway St	Coast Hwy	2U	Collector	10,000	2,900	0.290	A	260	0.102	A
	Coast Hwy	Ditmar St	2U	Collector	10,000	4,700	0.470	B	420	0.164	A
Vista Way	Broadway St	Coast Hwy	2U	Collector	10,000	4,000	0.400	B	360	0.141	A
	Coast Hwy	Ditmar St	3TWLT	Collector	22,500	30,800	1.369	F	2,770	0.721	C

Notes:
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F. ADT - Average Daily Traffic Volumes
G. LOS - Level of Service

Appendix B – Trip Caps

Daily Trips

Land Use	Node - Oceanside Transit Center					Avenue - Missouri Ave to Wisconsin Ave					Commercial Village - Wisconsin Avenue					Avenue 2 - Wisconsin Ave to Oceanside Blvd					Node - Sprinter Station					Avenue 3 - Channel Lane to Whaley					Node - South O					Commercial Village - South O					TOTAL				
	TAZs: 4736, 4737, 4693, 4695, 555, 4701					TAZs: 4702, 4703, 4704, 4706					TAZs: 4706, 569, 615, 4709, 4707, 4739					TAZs: 4739, 4707, 4761, 4740, 4710, 4743, 4711					TAZs: 4743, 4711, 607, 4713, 4713, 4715, 626, 4716, 4718, 629, 4720					TAZs: 629, 4720, 4721, 4722, 4744, 4745					TAZ: 4724					TAZs: 663, 4746, 4727, 4747, 707, 4748, 4728									
	Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips		
	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap
Residential	5 DU		231	266	35	67 DU		119	508	389	0 DU		0	0	0	218 DU		88	1,685	1,597	603 DU		1,097	4,605	3,508	-20 DU		1,255	1,094	-168	0 DU		0	0	0	-16 DU		103	0	-103	856 DU		2,893	8,159	5,266
Single-Family	2 DU		63	86	23	0 DU		49	49	0	0 DU		0	0	0	89 DU		45	894	849	0 DU		65	70	5	-11 DU		114	6	-108	0 DU		0	0	0	-3 DU		27	0	-27	78 DU		365	1,105	740
Multi-Family	2 DU		167	180	13	67 DU		70	459	389	0 DU		0	0	0	129 DU		42	790	748	603 DU		1,032	4,536	3,503	-9 DU		1,141	1,089	-52	0 DU		0	0	0	-13 DU		76	0	-76	779 DU		2,529	7,054	4,525
Retail	-4.9 ksq		6,722	6,511	-210	80.7 ksq		3,110	6,556	3,446	72.3 ksq		498	3,585	3,086	70.5 ksq		5,777	8,789	3,011	121.5 ksq		7,624	12,813	5,189	284.4 ksq		2,482	14,624	12,142	49.3 ksq		2,627	4,731	2,103	23.5 ksq		5,810	6,814	1,004	697.2 ksq		34,651	64,423	29,772
Office	57.1 ksq		74	704	630	28.4 ksq		0	313	313	2.9 ksq		0	32	32	15.8 ksq		0	174	174	18.1 ksq		34	234	200	2.2 ksq		0	24	24	9.4 ksq		0	104	104	54.8 ksq		0	604	604	188.6 ksq		108	2,189	2,081
Medical	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-1 ksq		43	0	-43	-10 ksq		377	0	-377	0 ksq		0	0	0	0 ksq		0	0	0	-12 ksq		419	0	-419
Hospitality	-17 room		136	0	-136	19 room		0	155	155	0 room		0	0	0	0 room		0	0	0	488 room		0	3,987	3,987	179 room		132	1,593	1,462	0 room		0	0	0	-38 room		415	106	-309	631 room		682	5,842	5,159
Auto	-1.7 ksq		759	703	-56	-44.9 ksq		1,451	0	-1,451	-13.9 ksq		448	0	-448	-18.3 ksq		591	0	-591	-32 ksq		1,103	70	-1,033	-49 ksq		1,645	70	-1,575	-4 ksq		122	0	-122	-12 ksq		397	0	-397	-176 ksq		6,516	844	-5,672
Industrial	-4.4 ksq		31	0	-31	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-2.4 ksq		17	0	-17	34 ksq		20	255	235	0 ksq		0	0	0	0 ksq		0	0	0	0 ksq		0	0	0	27 ksq		67	255	188
Storage	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-49 ksq		330	207	-123	0 ksq		0	0	0	0 ksq		0	0	0	0 ksq		0	0	0	-49 ksq		330	207	-123
Total			7,952	8,184	232			4,681	7,533	2,852			946	3,617	2,670			6,472	10,648	4,175			10,251	22,172	11,921			5,890	17,406	11,517			2,749	4,834	2,085			6,726	7,525	799			45,667	81,919	36,251

Notes:
1. Single-Family assumes 1,400 sq ft per dwelling unit and Multi-Family assumes 800 sq ft per dwelling unit based on Coast Highway Land Use Review (May 2015)
2. Hospitality assumes 600 sq ft per room based on Coast Highway Land Use Review (May 2015)
3. Trip rates based on existing land uses and Series 12 land uses; rates based on ITE trip generation manual (9th edition)
4. DU - Dwelling Unit; ksq - Thousand Square Feet
5. Trip Caps are based on Vision Plan (2035) and Existing scenarios
6. TAZs located within two planning areas were split by land use with the assumption of commercial/retail upfront along the corridor and residential behind

AM Peak Hour Trips

Land Use	Node - Oceanside Transit Center					Avenue - Missouri Ave to Wisconsin Ave					Commercial Village - Wisconsin Avenue					Avenue 2 - Wisconsin Ave to Oceanside Blvd					Node - Sprinter Station					Avenue 3 - Channel Lane to Whaley					Node - South O					Commercial Village - South O					TOTAL				
	TAZs: 4736, 4737, 4693, 4695, 555, 4701					TAZs: 4702, 4703, 4704, 4706					TAZs: 4706, 569, 615, 4709, 4707, 4739					TAZs: 4739, 4707, 4761, 4740, 4710, 4743, 4711					TAZs: 4743, 4711, 607, 4713, 4713, 4715, 626, 4716, 4718, 629, 4720					TAZs: 629, 4720, 4721, 4722, 4744, 4745					TAZ: 4724					TAZs: 663, 4746, 4727, 4747, 707, 4748, 4728									
	Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips		
	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap
Residential	5 DU		18	20	3	67 DU		9	39	29	0 DU		0	0	0	218 DU		7	130	124	603 DU		83	349	266	-20 DU		95	83	-12	0 DU		0	0	0	-16 DU		8	0	-8	856 DU		220	621	401
Single-Family	2 DU		5	7	2	0 DU		4	4	0	0 DU		0	0	0	89 DU		4	70	67	0 DU		5	5	0	-11 DU		9	0	-9	0 DU		0	0	0	-3 DU		2	0	-2	78 DU		29	87	58
Multi-Family	2 DU		13	14	1	67 DU		5	35	29	0 DU		0	0	0	129 DU		3	60	57	603 DU		78	344	265	-9 DU		86	82	-4	0 DU		0	0	0	-13 DU		6	0	-6	779 DU		191	534	343
Retail	-4.9 ksq		151	146	-5	80.7 ksq		70	147	77	72.3 ksq		11	81	69	70.5 ksq		130	198	68	121.5 ksq		171	288	117	284.4 ksq		56	329	273	49.3 ksq		59	106	47	23.5 ksq		131	153	23	697.2 ksq		779	1,448	669
Office	57.1 ksq		10	100	89	28.4 ksq		0	44	44	2.9 ksq		0	5	5	15.8 ksq		0	25	25	18.1 ksq		5	33	28	2.2 ksq		0	3	3	9.4 ksq		0	15	15	54.8 ksq		0	85	85	188.6 ksq		15	310	294
Medical	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-1.2 ksq		3	0	-3	-10.4 ksq		25	0	-25	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-11.6 ksq		28	0	-28
Hospitality	-17 room		9	0	-9	19 room		0	10	10	0 room		0	0	0	0 room		0	0	0	488 room		0	259	259	179 room		9	103	95	0 room		0	0	0	-38 room		27	7	-21	631 room		44	379	335
Auto	-1.7 ksq		45	42	-3	-44.9 ksq		86	0	-86	-13.9 ksq		27	0	-27	-18.3 ksq		35	0	-35	-32.0 ksq		66	4	-61	-48.8 ksq		98	4	-94	-3.8 ksq		7	0	-7	-12.3 ksq		24	0	-24	-175.6 ksq		387	50	-337
Industrial	-4.4 ksq		4	0	-4	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-2.4 ksq		2	0	-2	33.8 ksq		3	34	31	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	26.9 ksq		9	34	25
Storage	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-49.2 ksq		18	12	-7	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-49.2 ksq		18	12	-7
Total			237	308	71			165	240	75			38	85	47			174	353	179			349	978	629			282	523	240			66	121	55			189	246	58			1,501	2,854	1,352

Notes:
1. Single-Family assumes 1,400 sq ft per dwelling unit and Multi-Family assumes 800 sq ft per dwelling unit based on Coast Highway Land Use Review (May 2015)
2. Hospitality assumes 600 sq ft per room based on Coast Highway Land Use Review (May 2015)
3. Trip rates based on existing land uses and Series 12 land uses; rates based on ITE trip generation manual (9th edition)
4. DU - Dwelling Unit; ksq - Thousand Square Feet
5. Trip Caps are based on Vision Plan (2035) and Existing scenarios
6. TAZs located within two planning areas were split by land use with the assumption of commercial/retail upfront along the corridor and residential behind

PM Peak Hour Trips

Land Use	Node - Oceanside Transit Center					Avenue - Missouri Ave to Wisconsin Ave					Commercial Village - Wisconsin Avenue					Avenue 2 - Wisconsin Ave to Oceanside Blvd					Node - Sprinter Station					Avenue 3 - Channel Lane to Whaley					Node - South O					Commercial Village - South O					TOTAL				
	TAZs: 4736, 4737, 4693, 4695, 555, 4701					TAZs: 4702, 4703, 4704, 4706					TAZs: 4706, 569, 615, 4709, 4707, 4739					TAZs: 4739, 4707, 4761, 4740, 4710, 4743, 4711					TAZs: 4743, 4711, 607, 4713, 4713, 4715, 626, 4716, 4718, 629, 4720					TAZs: 629, 4720, 4721, 4722, 4744, 4745					TAZ: 4724					TAZs: 663, 4746, 4727, 4747, 707, 4748, 4728									
	Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips			Net Change		Trips		
	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap	Amount	Unit	Existing	Vision Plan (2035)	Trip Cap
Residential	5 DU		22	25	4	67 DU		11	46	35	0 DU		0	0	0	218 DU		9	165	156	603 DU		99	413	314	-20 DU		114	98	-16	0 DU		0	0	0	-16 DU		10	0	-10	856 DU		265	747	483
Single-Family	2 DU		7	9	2	0 DU		5	5	0	0 DU		0	0	0	89 DU		5	94	89	0 DU		7	7	0	-11 DU		12	1	-11	0 DU		0	0	0	-3 DU		3	0	-3	78 DU		38	116	78
Multi-Family	2 DU		15	16	1	67 DU		6	41	35	0 DU		0	0	0	129 DU		4	71	67	603 DU		92	406	314	-9 DU		102	97	-5	0 DU		0	0	0	-13 DU		7	0	-7	779 DU		226	631	405
Retail	-4.9 ksq		584	566	-18	80.7 ksq		270	570	299	72.3 ksq		43	311	268	70.5 ksq		502	764	262	121.5 ksq		662	1,113	451	284.4 ksq		216	1,271	1,055	49.3 ksq		228	411	183	23.5 ksq		505	592	87	697.2 ksq		3,011	5,597	2,587
Office	57.1 ksq		10	95	85	28.4 ksq		0	42	42	2.9 ksq		0	4	4	15.8 ksq		0	24	24	18.1 ksq		5	32	27	2.2 ksq		0	3	3	9.4 ksq		0	14	14	54.8 ksq		0	82	82	188.6 ksq		15	296	281
Medical	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-1.2 ksq		4	0	-4	-10.4 ksq		37	0	-37	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-11.6 ksq		41	0	-41
Hospitality	-17 room		10	0	-10	19 room		0	11	11	0 room		0	0	0	0 room		0	0	0	488 room		0	293	293	179 room		10	117	107	0 room		0	0	0	-38 room		30	8	-23	631 room		50	429	379
Auto	-1.7 ksq		62	57	-5	-44.9 ksq		118	0	-118	-13.9 ksq		36	0	-36	-18.3 ksq		48	0	-48	-32.0 ksq		89	6	-84	-48.8 ksq		133	6	-128	-3.8 ksq		10	0	-10	-12.3 ksq		32	0	-32	-175.6 ksq		529	68	-460
Industrial	-4.4 ksq		4	0	-4	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-2.4 ksq		2	0	-2	33.8 ksq		3	35	33	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	26.9 ksq		9	35	26
Storage	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-49.2 ksq		34	22	-13	0.0 ksq		0	0	0	0.0 ksq		0	0	0	0.0 ksq		0	0	0	-49.2 ksq		34	22	-13
Total			691	743	52			399	669	270			80	316	236			561	952	391			897	1,914	1,017			510	1,495	985			238	425	187			577	681	104			3,954	7,195	3,241

Notes:
1. Single-Family assumes 1,400 sq ft per dwelling unit and Multi-Family assumes 800 sq ft per dwelling unit based on Coast Highway Land Use Review (May 2015)
2. Hospitality assumes 600 sq ft per room based on Coast Highway Land Use Review (May 2015)
3. Trip rates based on existing land uses and Series 12 land uses; rates based on ITE trip generation manual (9th edition)
4. DU - Dwelling Unit; ksq - Thousand Square Feet
5. Trip Caps are based on Vision Plan (2035) and Existing scenarios
6. TAZs located within two planning areas were split by land use with the assumption of commercial/retail upfront along the corridor and residential behind

Appendix C – Existing Count Data

ITM Peak Hour Summary

Prepared by:

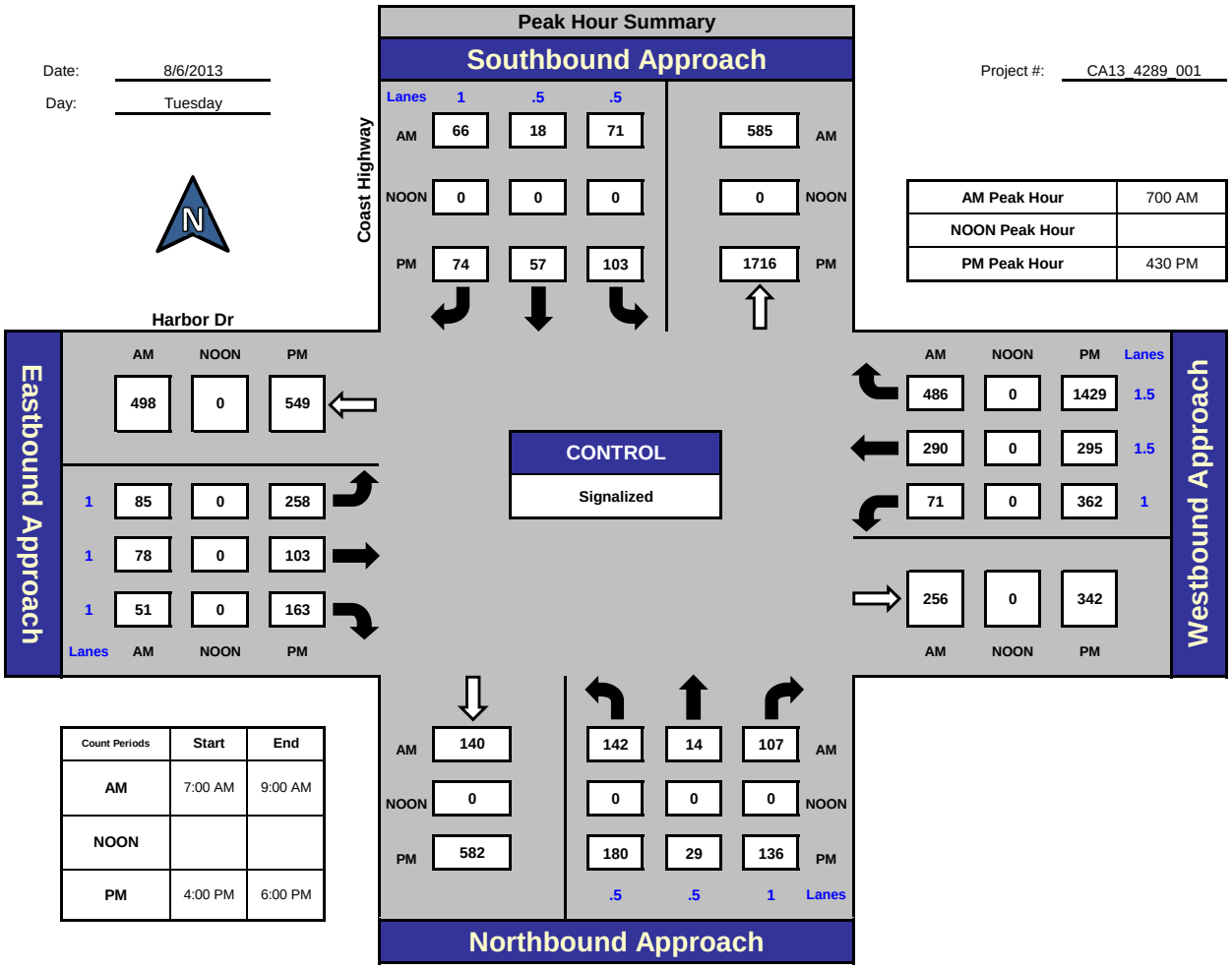
National Data & Surveying Services

Coast Highway and Harbor Dr , City of Oceanside

Date: 8/6/2013

Day: Tuesday

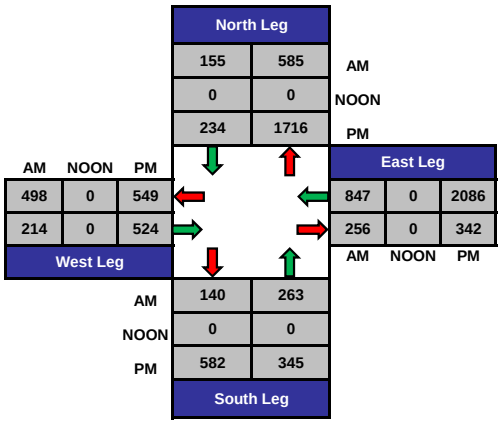
Project #: CA13_4289_001



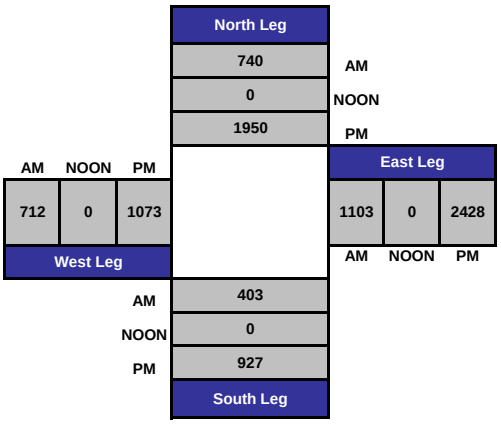
AM Peak Hour	700 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

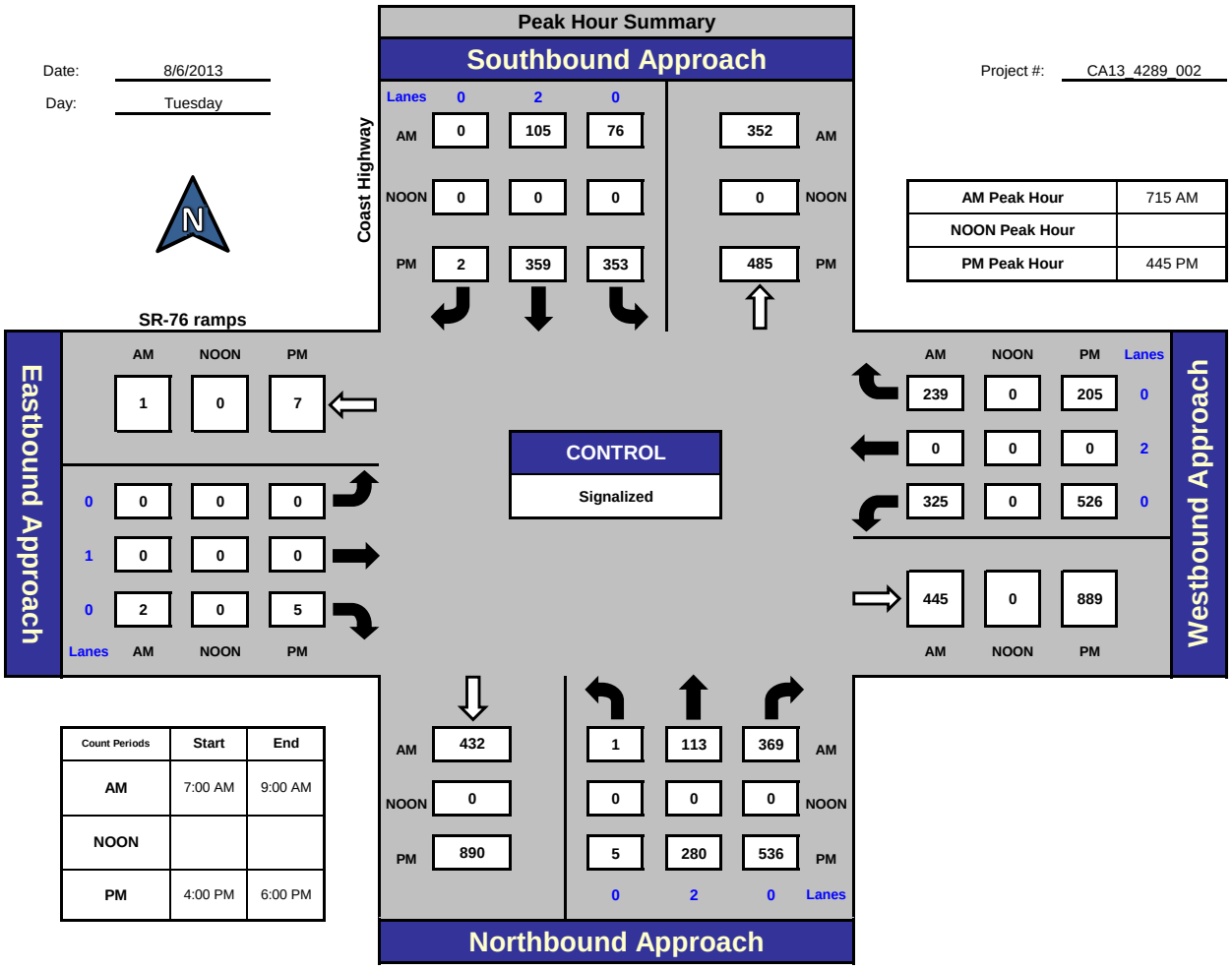
National Data & Surveying Services

Coast Highway and SR-76 ramps , City of Oceanside

Date: 8/6/2013

Day: Tuesday

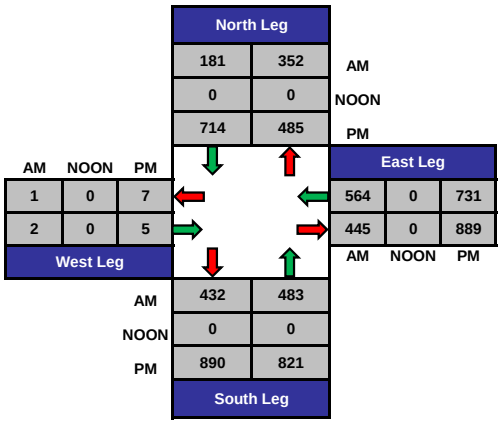
Project #: CA13_4289_002



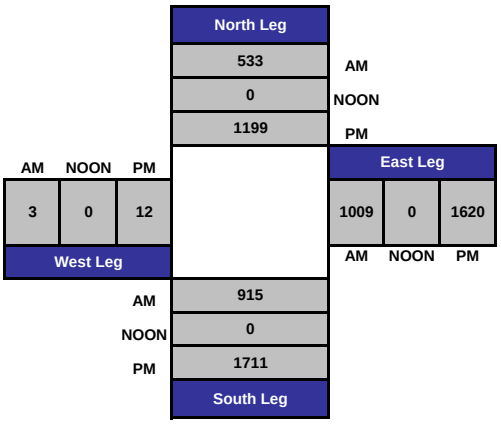
AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Pacific St and Surfrider St , City of Oceanside

Date: 8/6/2013

Day: Tuesday

Project #: CA13_4289_003

AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	500 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Peak Hour Summary

Southbound Approach

Lanes	0	1	0		
AM	12	59	79	100	AM
NOON	0	0	0	0	NOON
PM	25	106	115	179	PM

Pacific St

Surfrider St

Eastbound Approach

	AM	NOON	PM	
	90	0	131	
0	4	0	1	
1	39	0	38	
0	9	0	26	
Lanes	AM	NOON	PM	

Westbound Approach

	AM	NOON	PM	Lanes
	53	0	100	0
	50	0	65	1
	29	0	62	0
	160	0	218	
	AM	NOON	PM	

CONTROL

4-Way Stop

Northbound Approach

AM	97	28	43	42	AM
NOON	0	0	0	0	NOON
PM	194	41	78	65	PM
		0	1	0	Lanes

Total Ins & Outs

			North Leg					
			150	100	AM			
			0	0	NOON			
			246	179	PM			
AM	NOON	PM				East Leg		
90	0	131				132	0	227
52	0	65				160	0	218
West Leg						AM	NOON	PM
			AM	97	113			
			NOON	0	0			
			PM	194	184			
			South Leg					

Total Volume Per Leg

			North Leg					
			250		AM			
			0		NOON			
			425		PM			
AM	NOON	PM				East Leg		
142	0	196				292	0	445
West Leg						AM	NOON	PM
			AM	210				
			NOON	0				
			PM	378				
			South Leg					

ITM Peak Hour Summary

Prepared by:

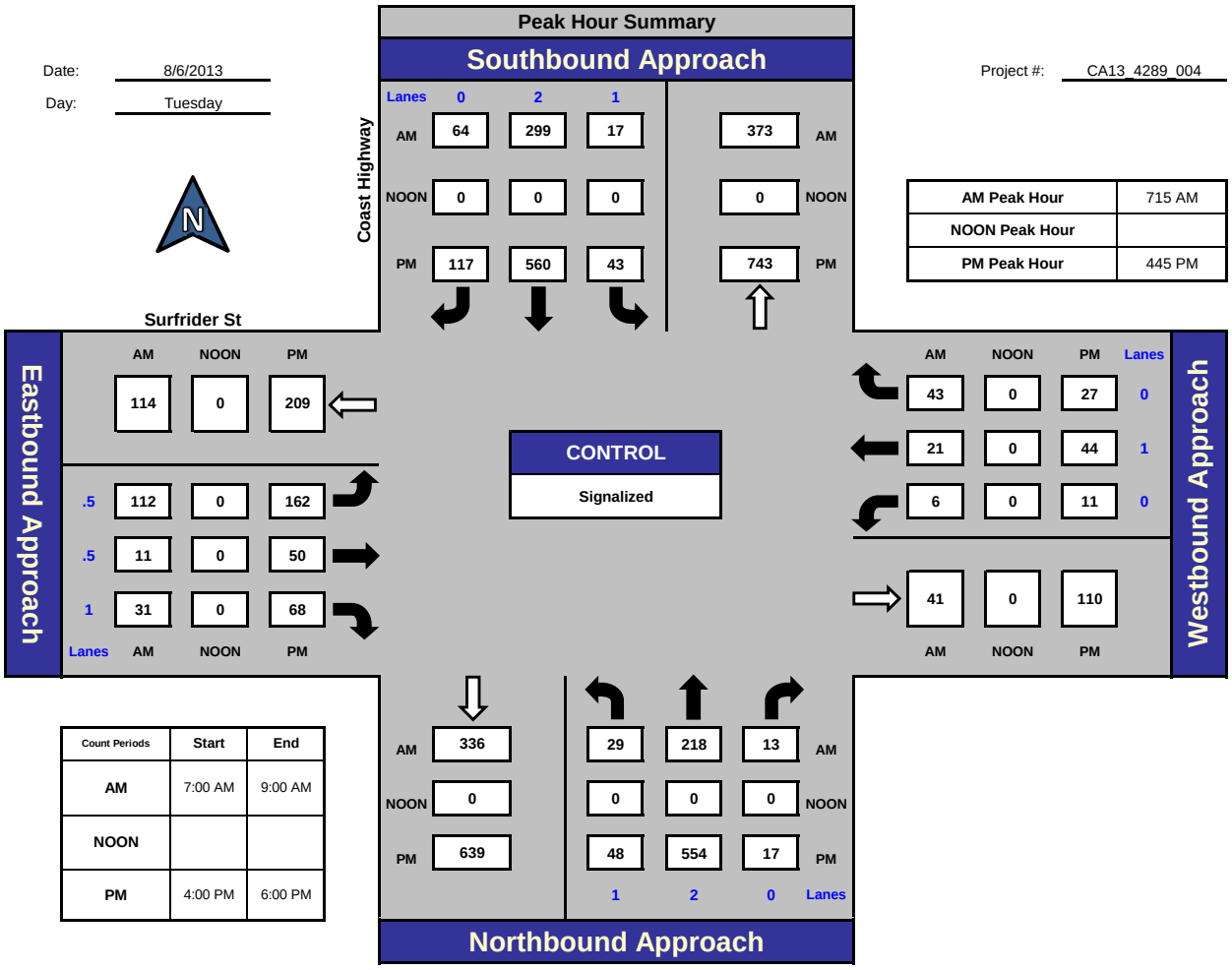
National Data & Surveying Services

Coast Highway and Surfrider St , City of Oceanside

Date: 8/6/2013

Day: Tuesday

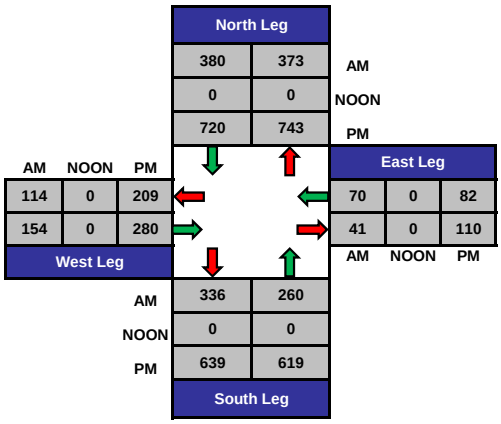
Project #: CA13_4289_004



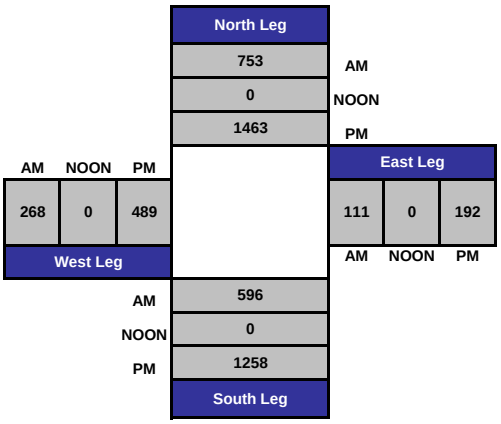
AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

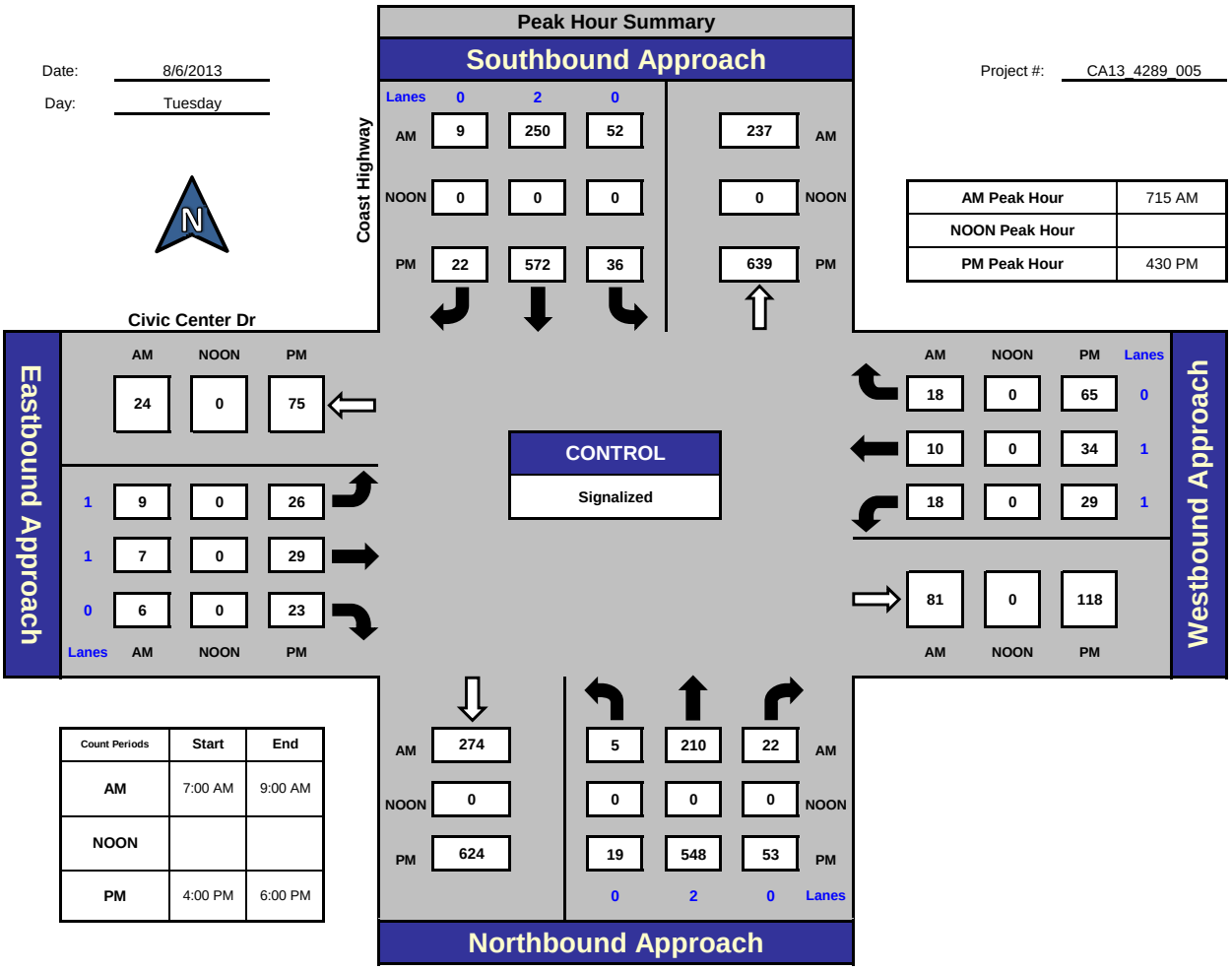
National Data & Surveying Services

Coast Highway and Civic Center Dr , City of Oceanside

Date: 8/6/2013

Day: Tuesday

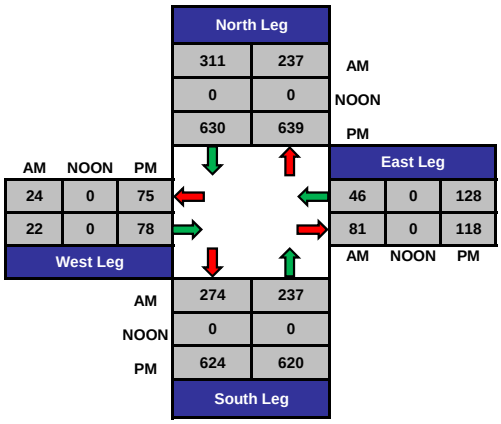
Project #: CA13_4289_005



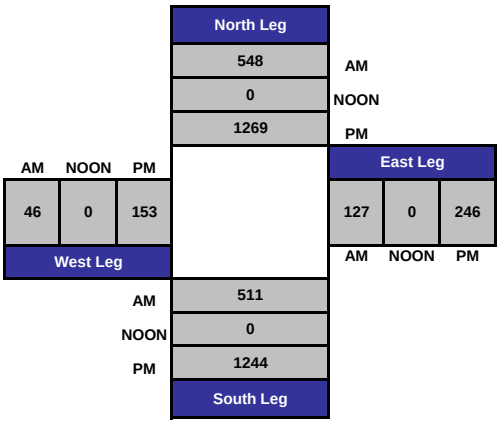
AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

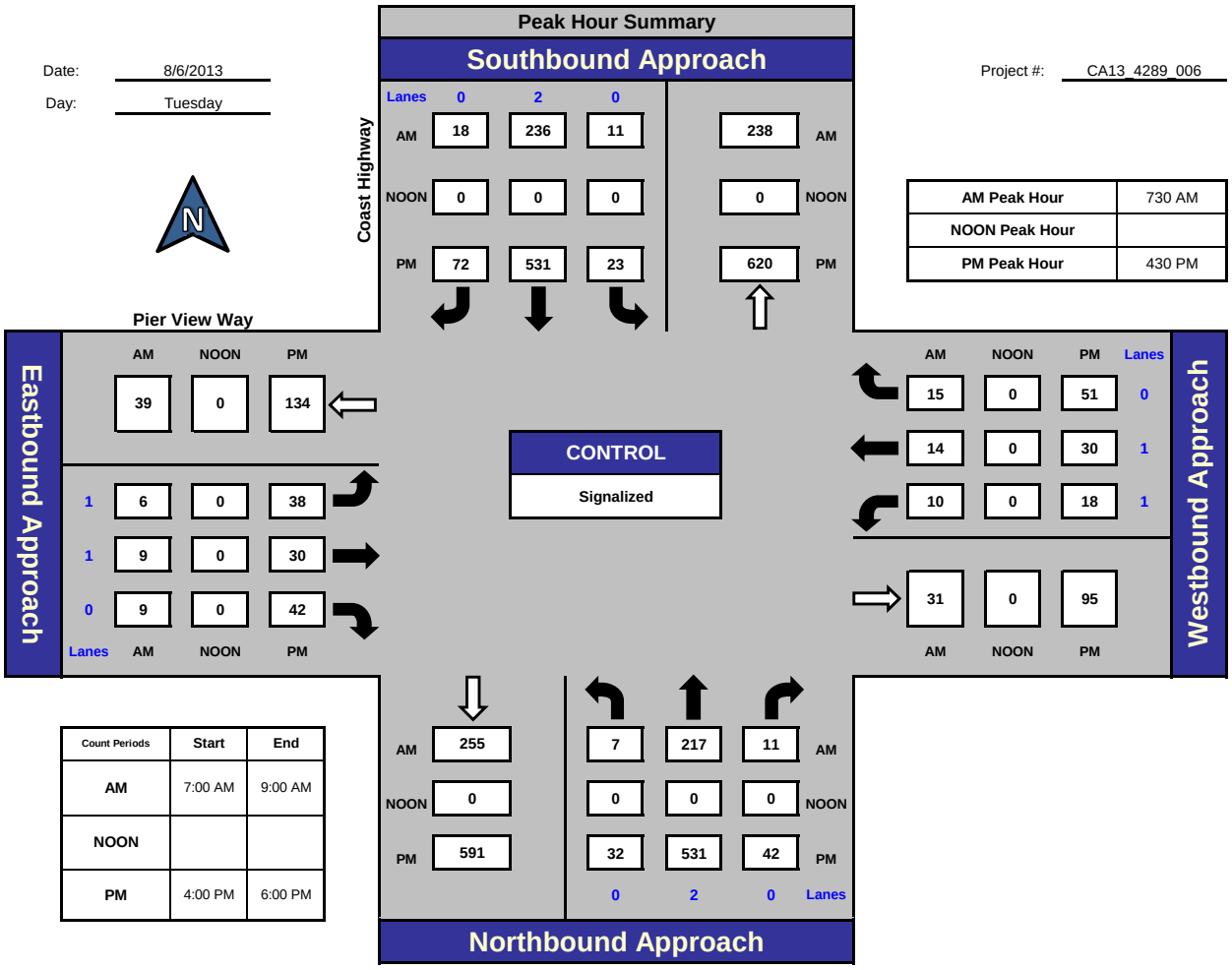
National Data & Surveying Services

Coast Highway and Pier View Way , City of Oceanside

Date: 8/6/2013

Day: Tuesday

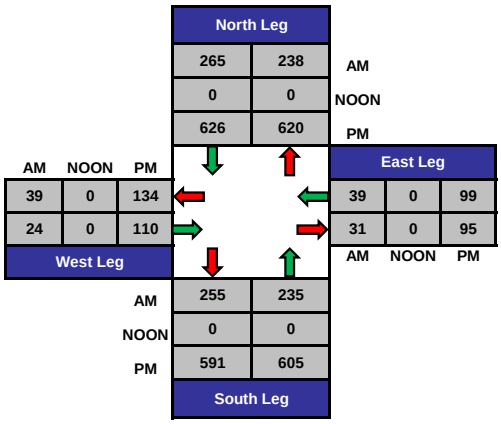
Project #: CA13_4289_006



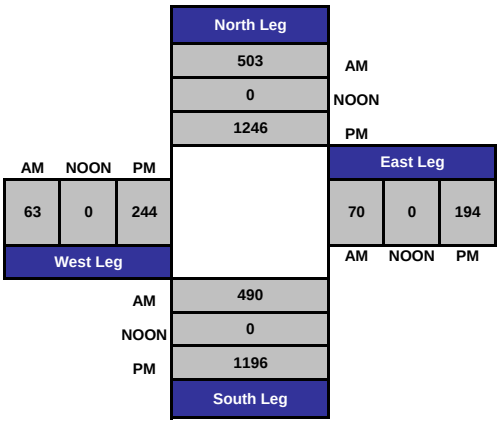
AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Horne St and Pier View Way , City of Oceanside

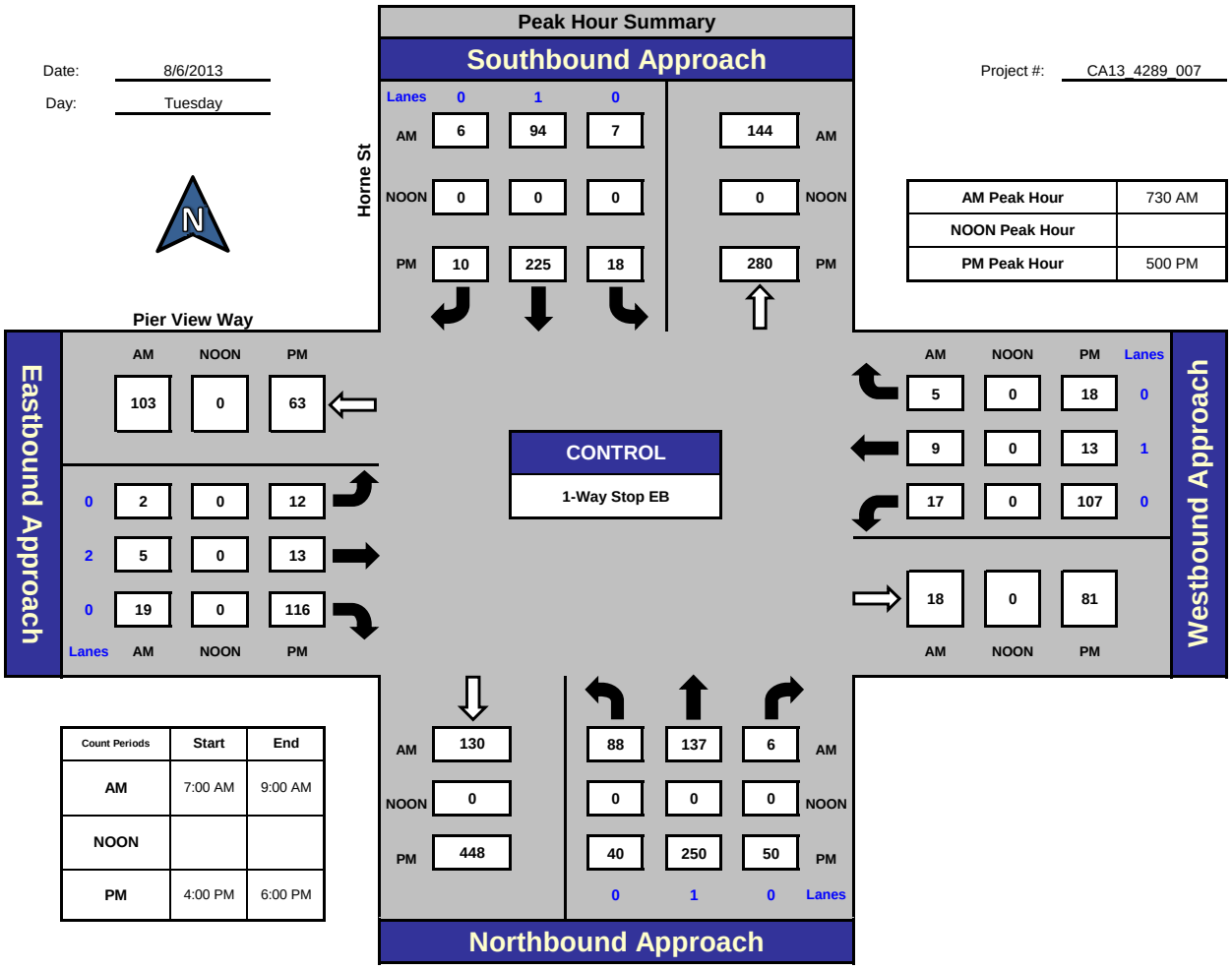
Date: 8/6/2013

Day: Tuesday

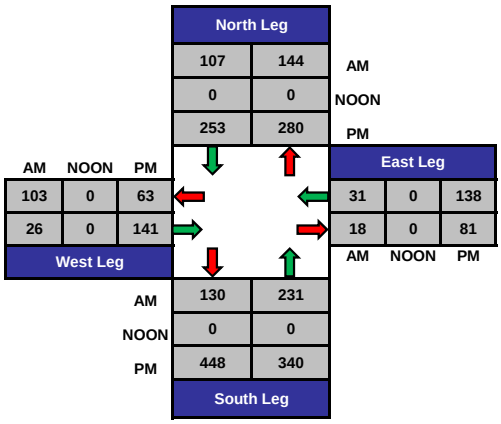
Project #: CA13_4289_007

AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	500 PM

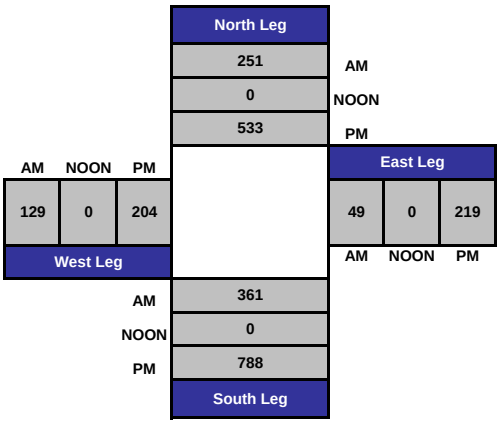
Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM



Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Pacific St and Mission Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

Project #: CA13_4289_008

AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	415 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Peak Hour Summary

Southbound Approach (Pacific St)

	Lanes	0	1	0		
AM		0	65	27	120	AM
NOON		0	0	0	0	NOON
PM		0	124	59	187	PM

Eastbound Approach (Mission Ave)

Lanes	AM	NOON	PM
	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Westbound Approach

	AM	NOON	PM	Lanes
	46	0	81	0
	0	0	0	2
	80	0	181	0
	83	0	185	

CONTROL

3-Way Stop NB/SB/WB

Northbound Approach

AM	145	0	74	56	AM
NOON	0	0	0	0	NOON
PM	305	0	106	126	PM
Lanes		0	1	0	Lanes

Total Ins & Outs

	North Leg		
AM	92	120	AM
NOON	0	0	NOON
PM	183	187	PM

West Leg				East Leg		
AM	NOON	PM		AM	NOON	PM
0	0	0		126	0	262
0	0	0		83	0	185

	South Leg	
AM	145	130
NOON	0	0
PM	305	232

Total Volume Per Leg

	North Leg	
AM	212	AM
NOON	0	NOON
PM	370	PM

West Leg			East Leg		
AM	NOON	PM	AM	NOON	PM
0	0	0	209	0	447

	South Leg
AM	275
NOON	0
PM	537

ITM Peak Hour Summary

Prepared by:

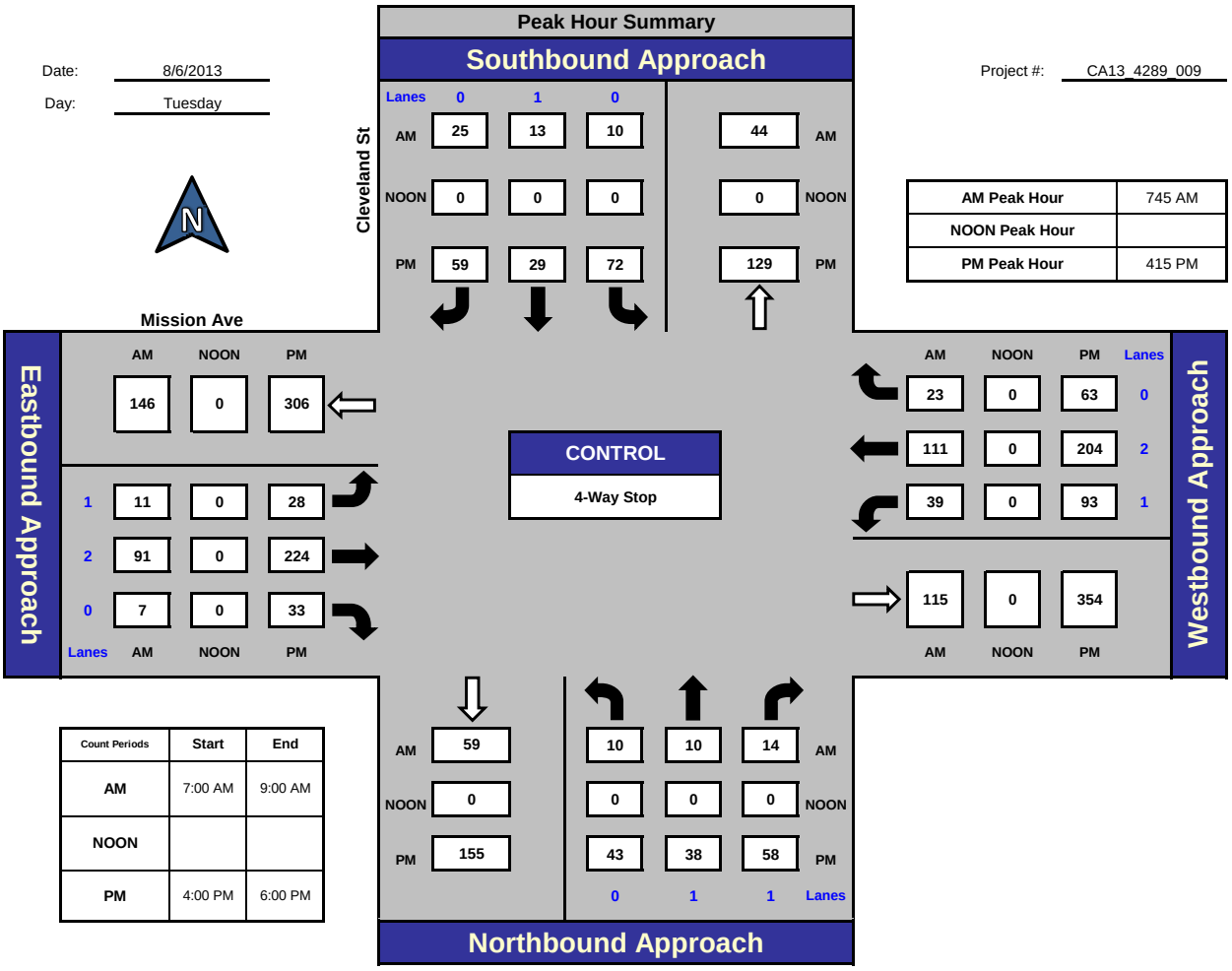
National Data & Surveying Services

Cleveland St and Mission Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

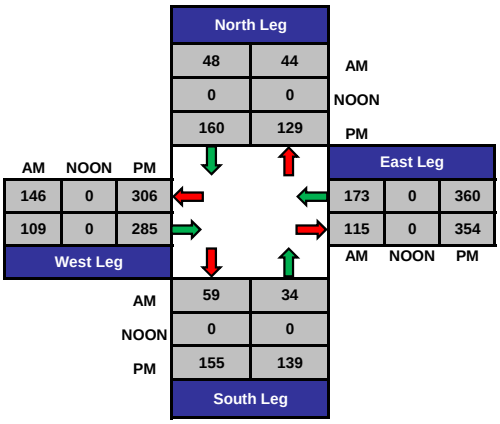
Project #: CA13_4289_009



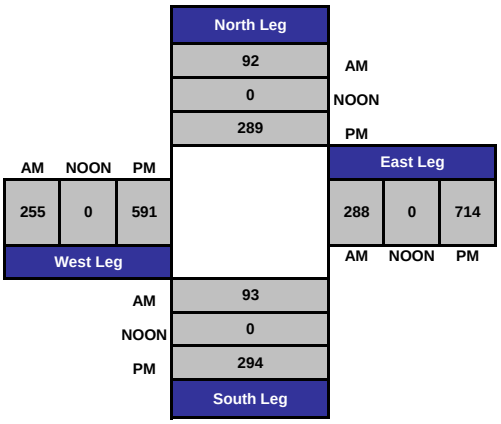
AM Peak Hour	745 AM
NOON Peak Hour	
PM Peak Hour	415 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

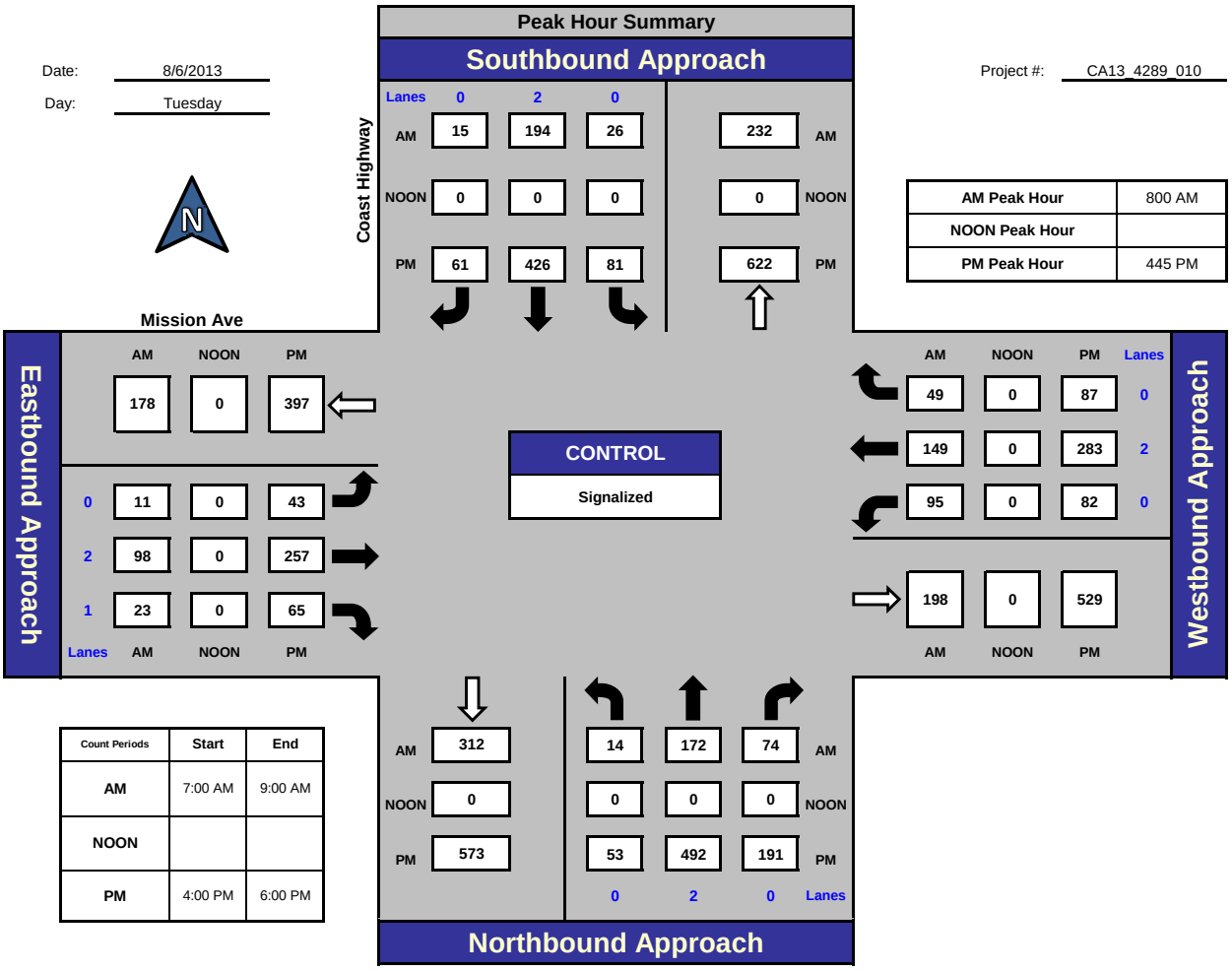
National Data & Surveying Services

Coast Highway and Mission Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

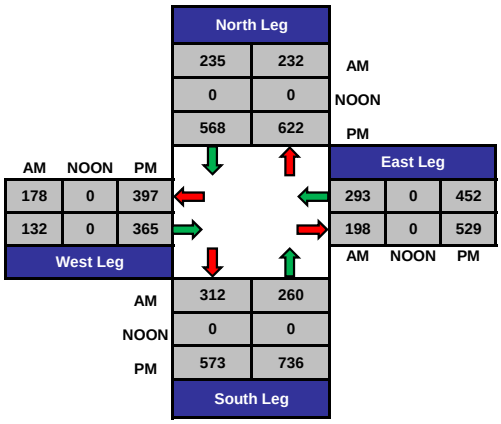
Project #: CA13_4289_010



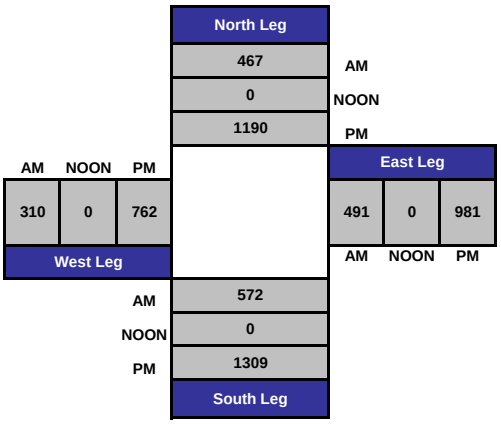
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Horne St and Mission Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

Project #: CA13_4289_011

AM Peak Hour	745 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Peak Hour Summary

Southbound Approach (Horne St)

	Lanes .3	.3	1.3		
AM	7	10	132	213	AM
NOON	0	0	0	0	NOON
PM	25	51	365	347	PM

Eastbound Approach (Mission Ave)

Lanes	AM	NOON	PM
	472	0	668
1	5	0	35
2	258	0	662
0	2	0	3
Lanes	AM	NOON	PM

Westbound Approach

	AM	NOON	PM	Lanes
	194	0	268	1
	462	0	638	2
	50	0	142	1
	499	0	1258	
	AM	NOON	PM	

CONTROL: Signalized

Northbound Approach

AM	62	3	14	109	AM
NOON	0	0	0	0	NOON
PM	196	5	44	231	PM
		0	1	0	Lanes

Total Ins & Outs

	North Leg		
	149	213	AM
	0	0	NOON
	441	347	PM

West Leg			East Leg		
AM	NOON	PM			
472	0	668	706	0	1048
265	0	700	499	0	1258
			AM	NOON	PM

	South Leg	
AM	62	126
NOON	0	0
PM	196	280

Total Volume Per Leg

	North Leg	
	362	AM
	0	NOON
	788	PM

West Leg			East Leg		
AM	NOON	PM			
737	0	1368	1205	0	2306
			AM	NOON	PM

	South Leg
AM	188
NOON	0
PM	476

ITM Peak Hour Summary

Prepared by:

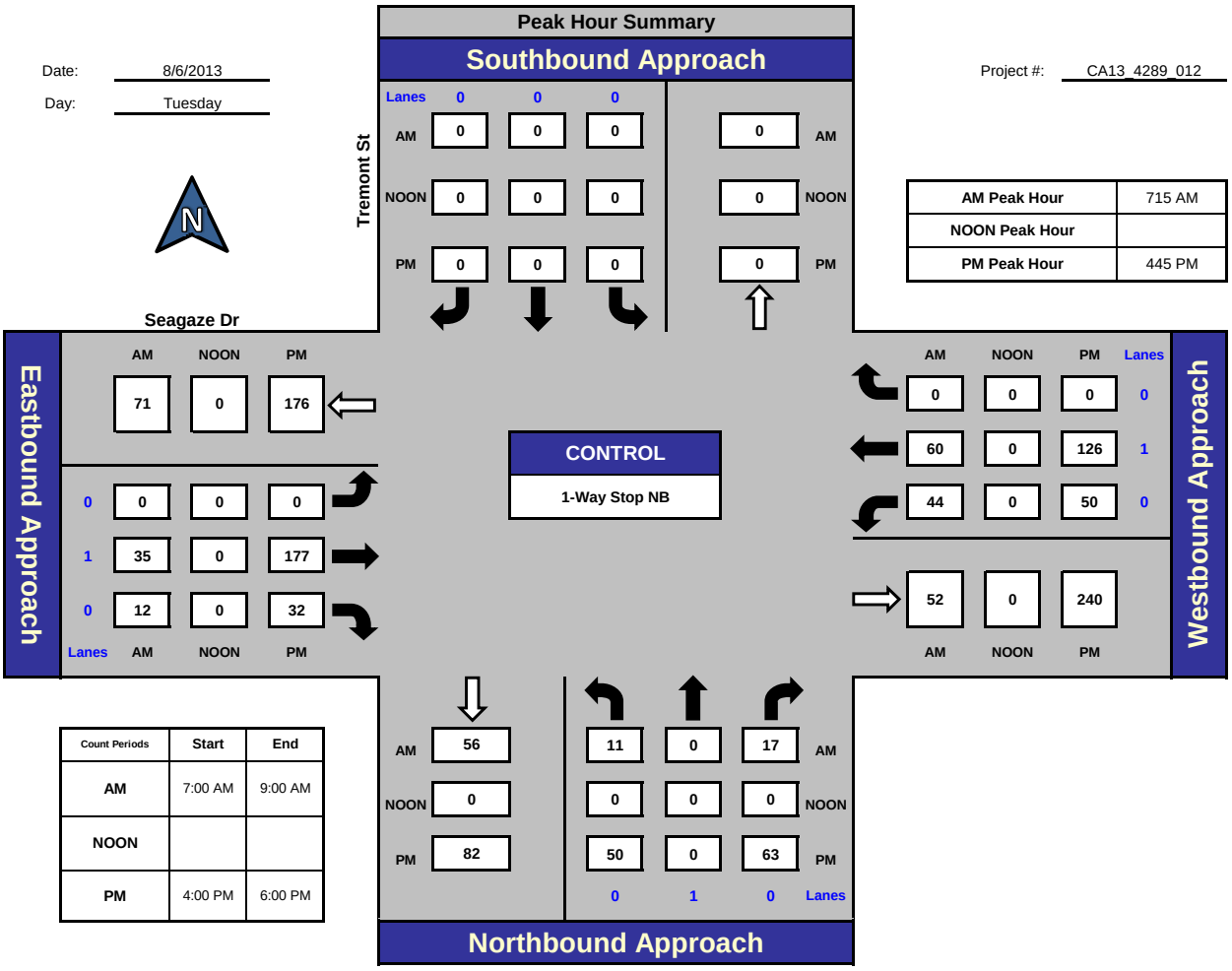
National Data & Surveying Services

Tremont St and Seagaze Dr , City of Oceanside

Date: 8/6/2013

Day: Tuesday

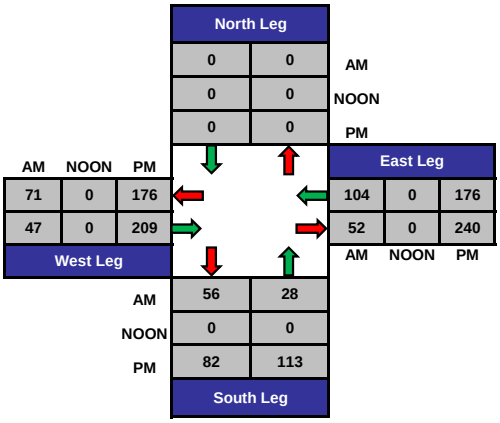
Project #: CA13_4289_012



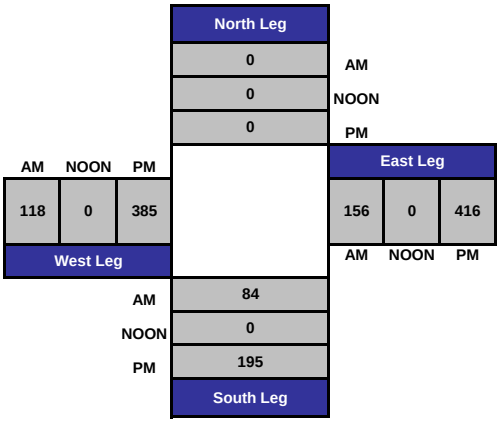
AM Peak Hour	715 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

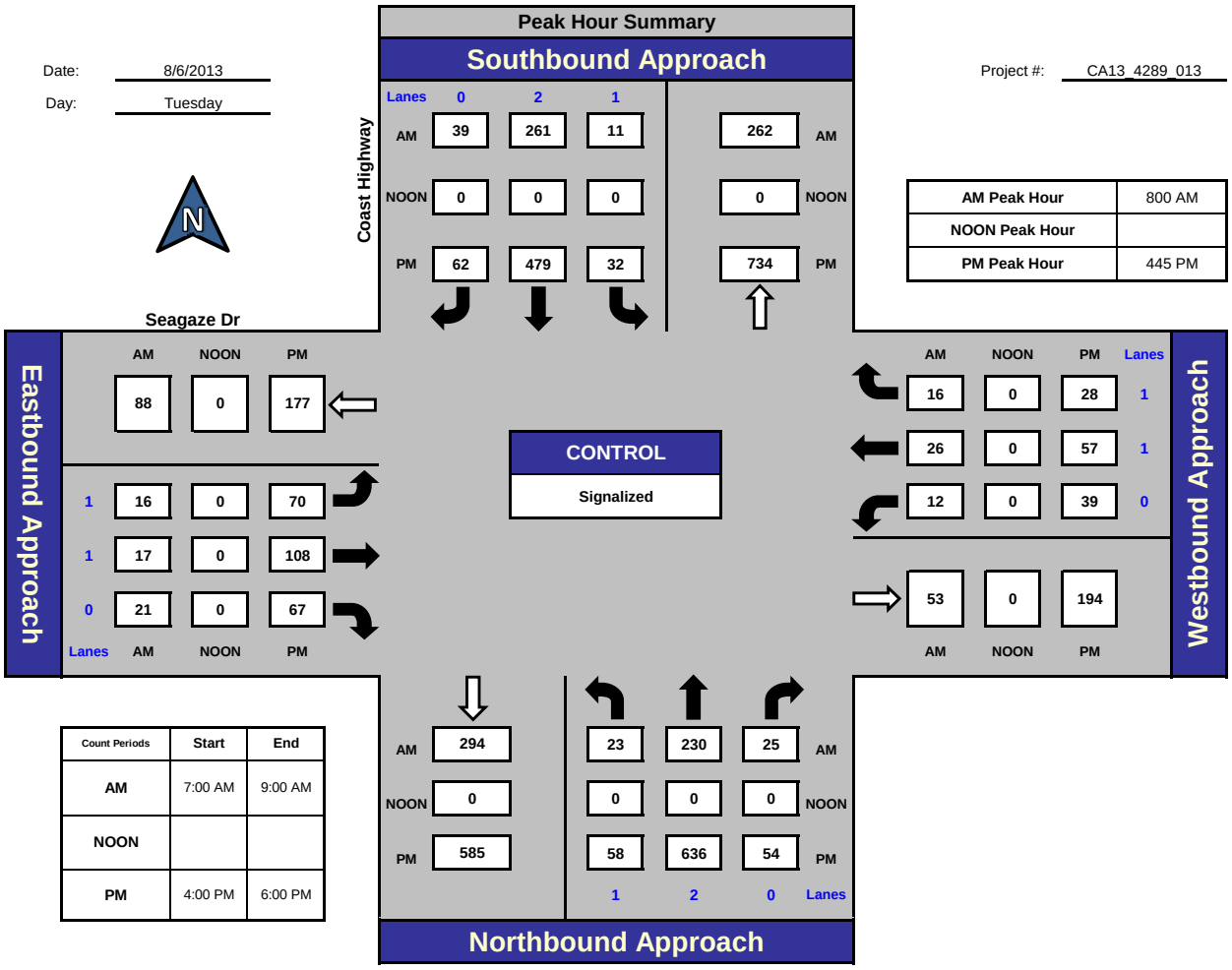
National Data & Surveying Services

Coast Highway and Seagaze Dr , City of Oceanside

Date: 8/6/2013

Day: Tuesday

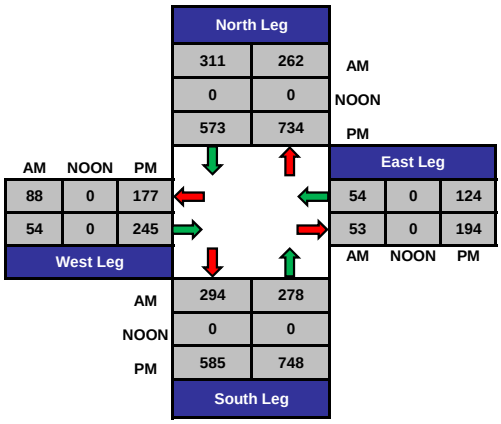
Project #: CA13_4289_013



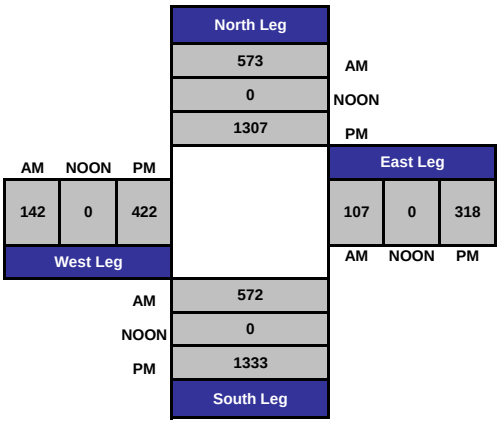
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

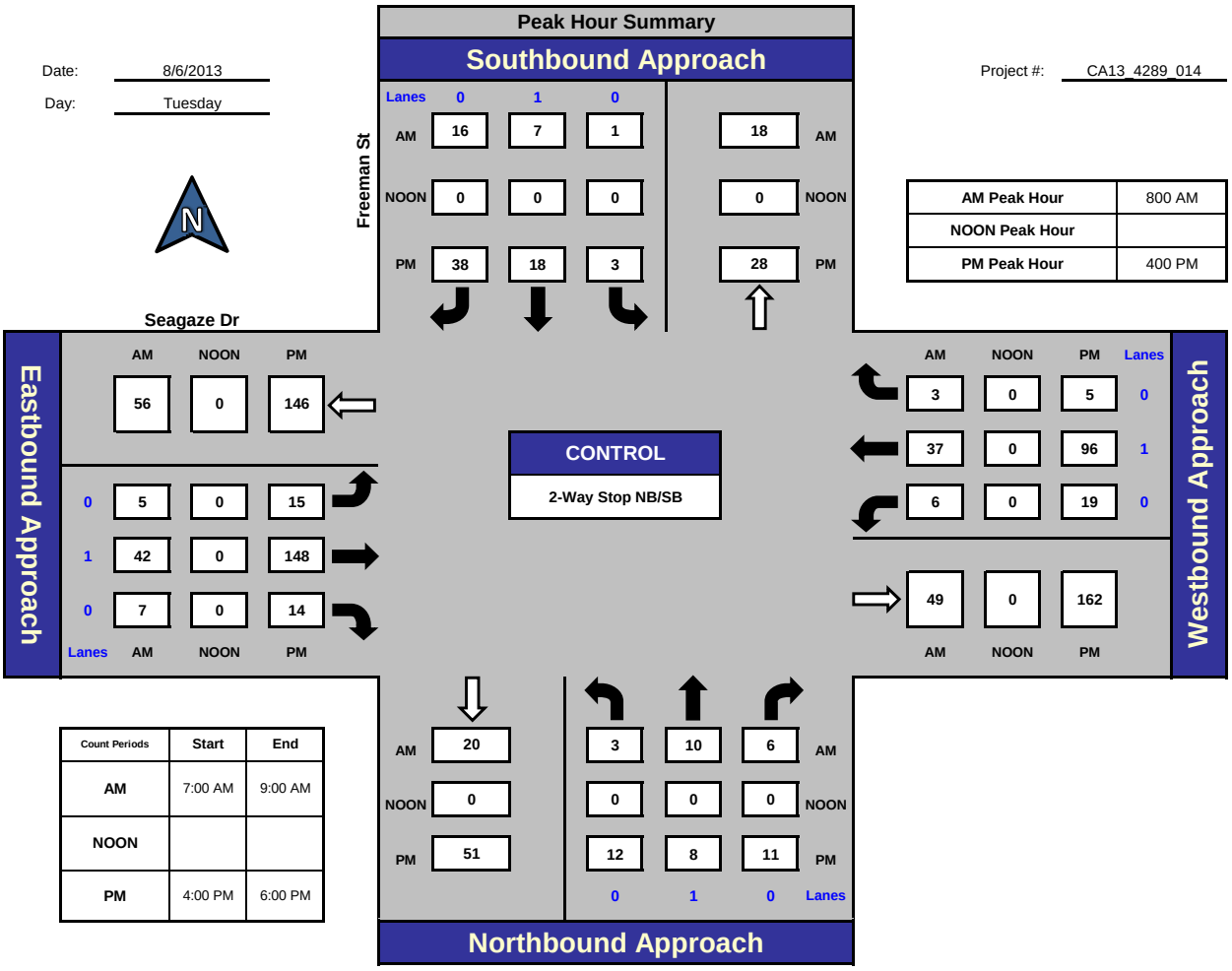
National Data & Surveying Services

Freeman St and Seagaze Dr , City of Oceanside

Date: 8/6/2013

Day: Tuesday

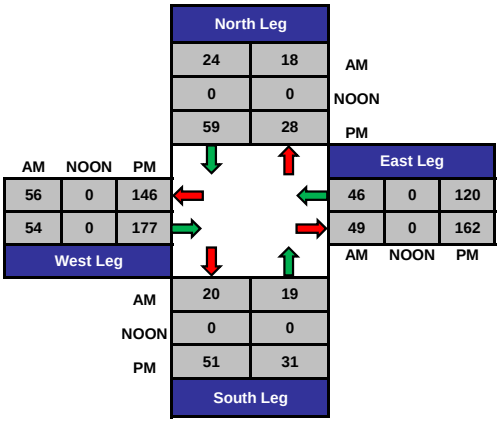
Project #: CA13_4289_014



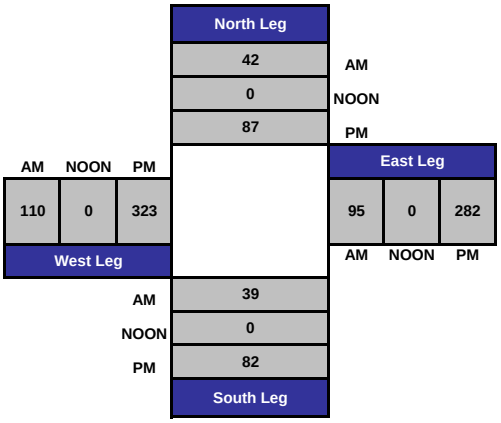
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	400 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

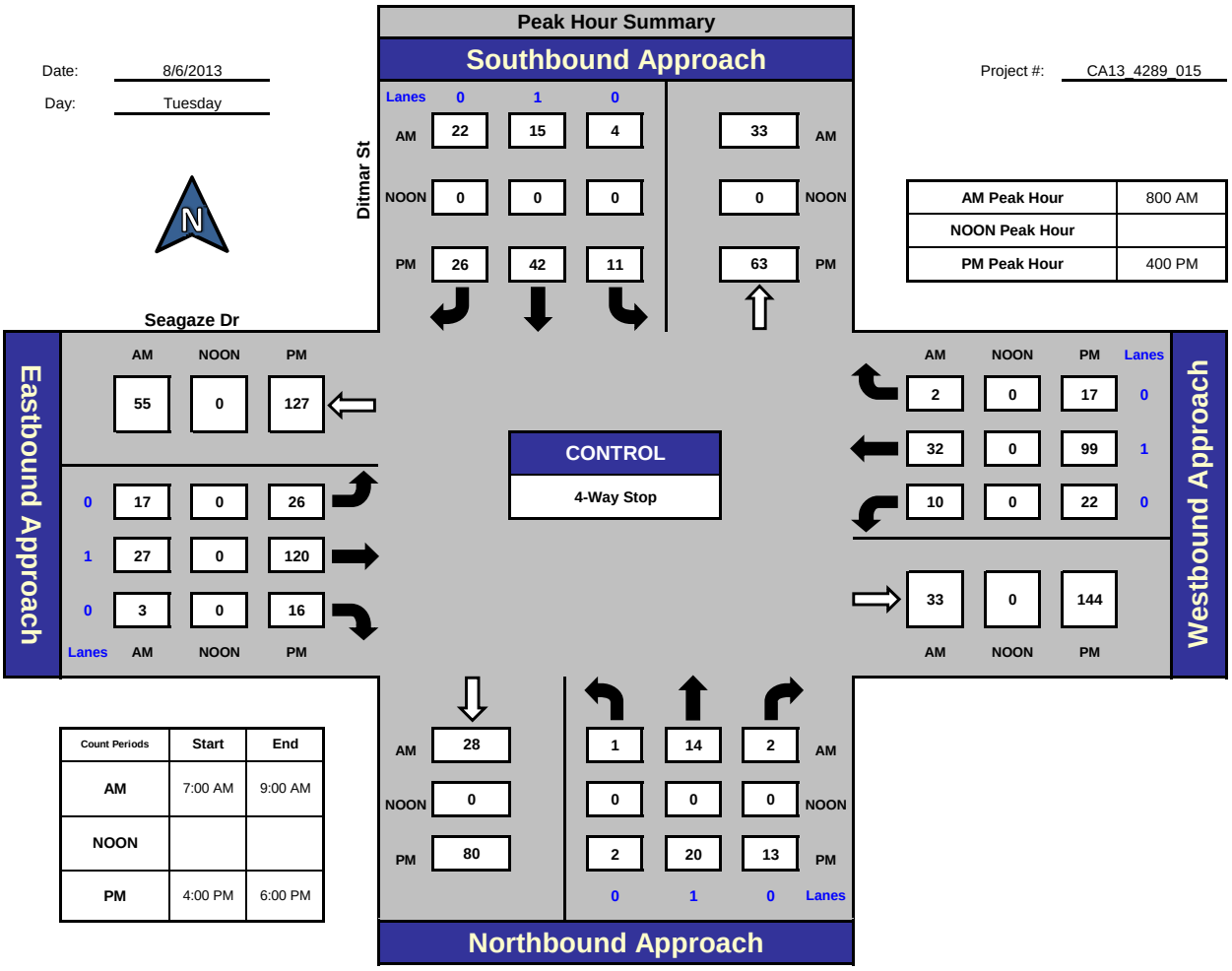
National Data & Surveying Services

Ditmar St and Seagaze Dr , City of Oceanside

Date: 8/6/2013

Day: Tuesday

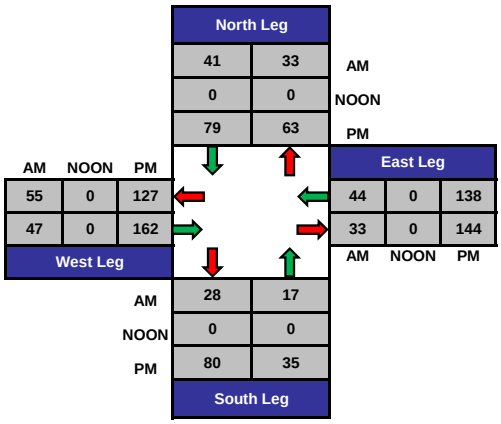
Project #: CA13_4289_015



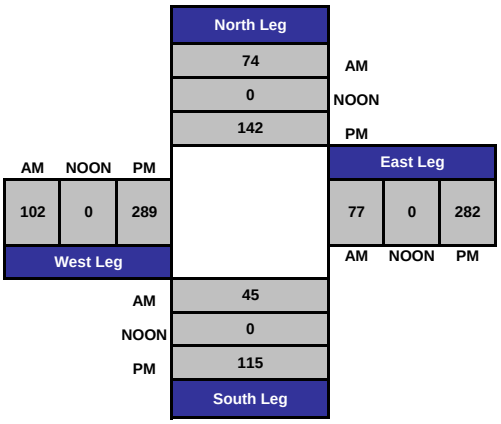
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	400 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

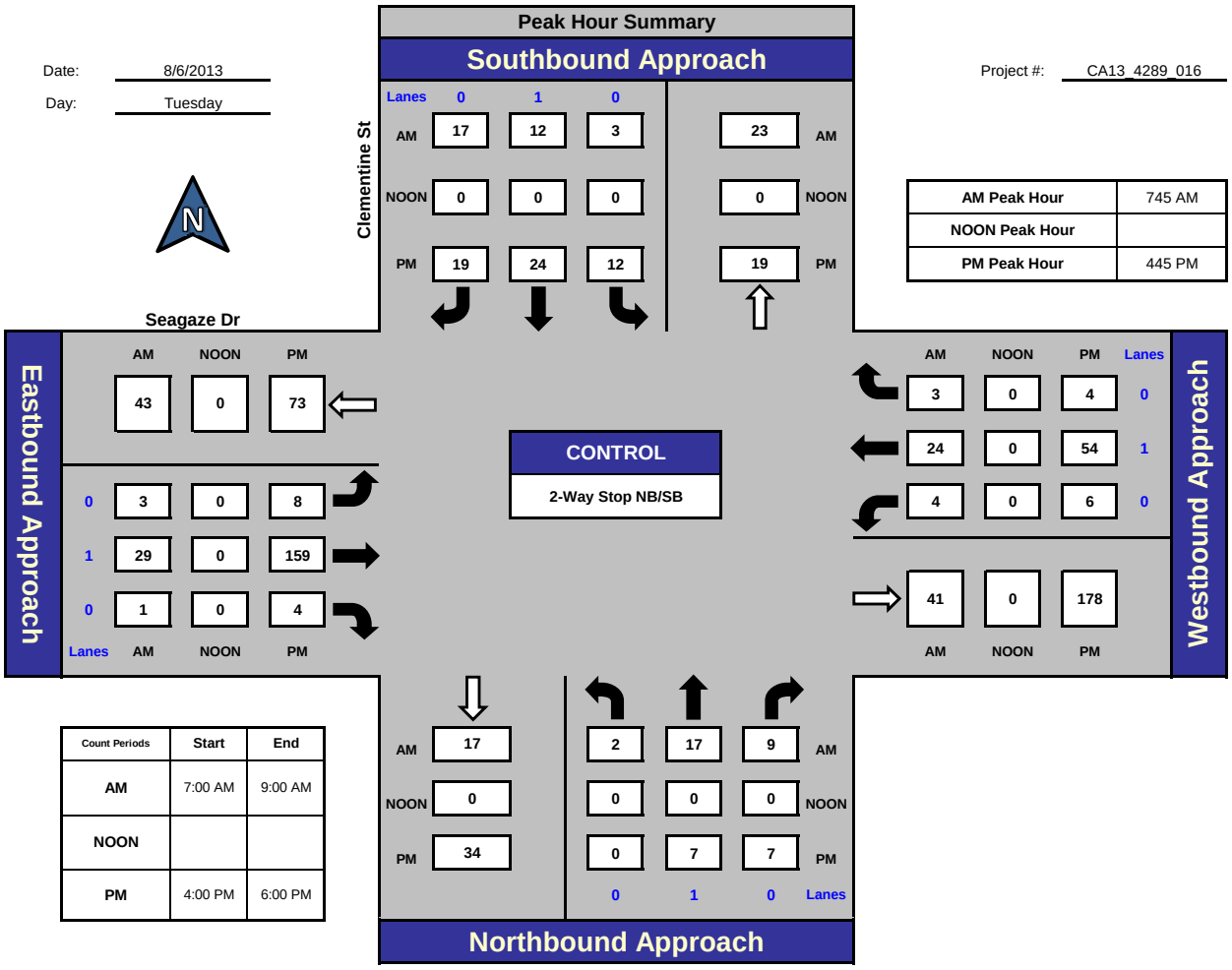
National Data & Surveying Services

Clementine St and Seagaze Dr , City of Oceanside

Date: 8/6/2013

Day: Tuesday

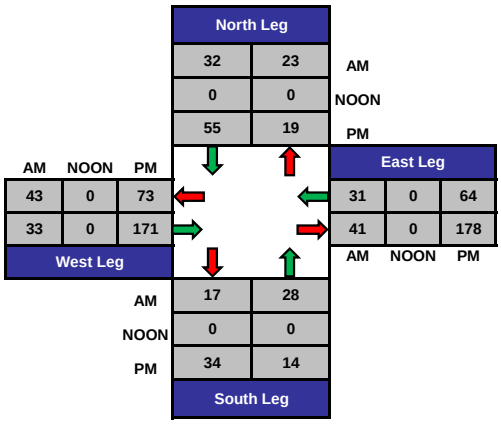
Project #: CA13_4289_016



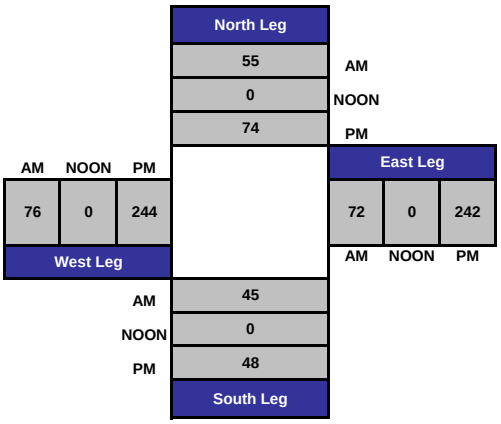
AM Peak Hour	745 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

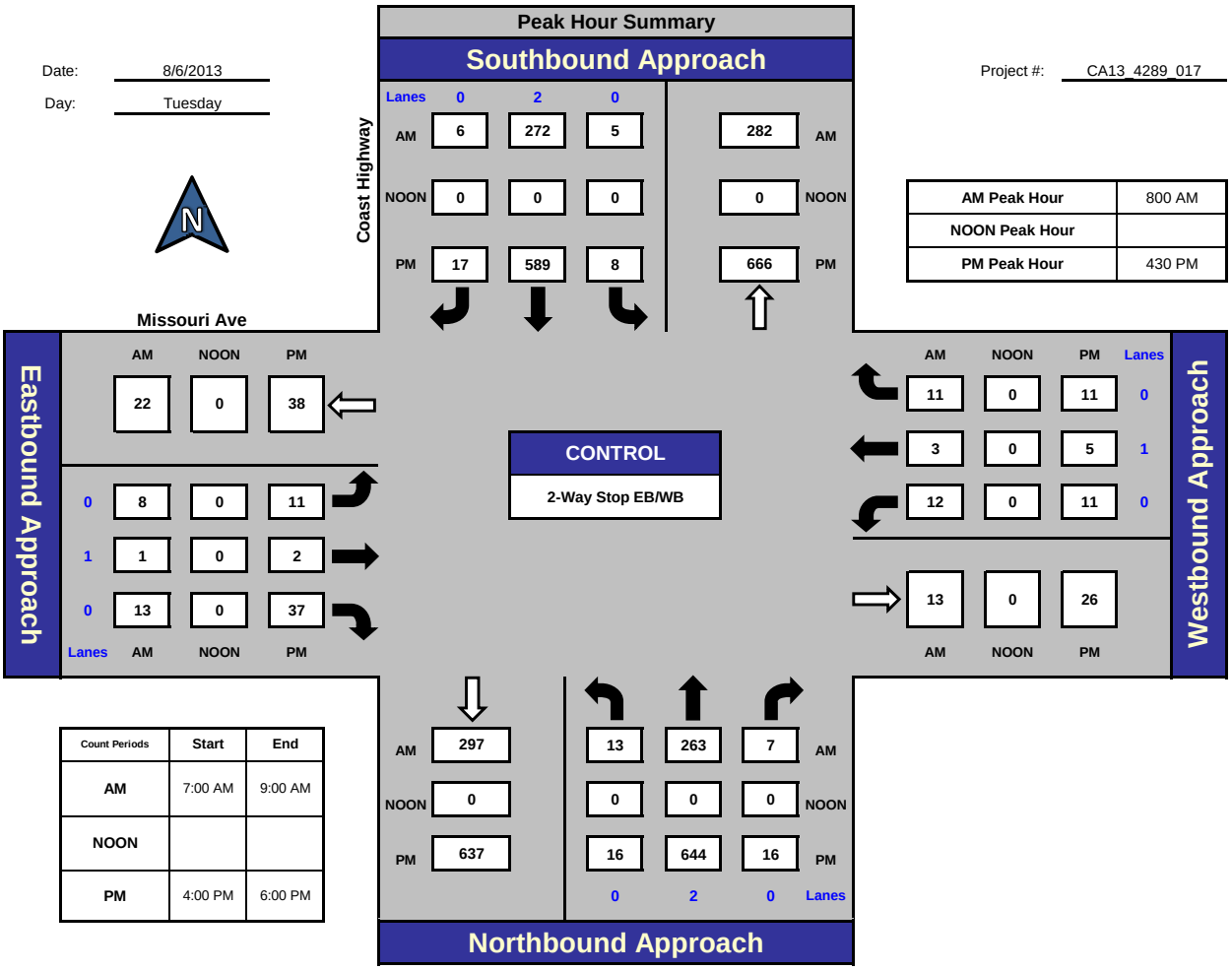
National Data & Surveying Services

Coast Highway and Missouri Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

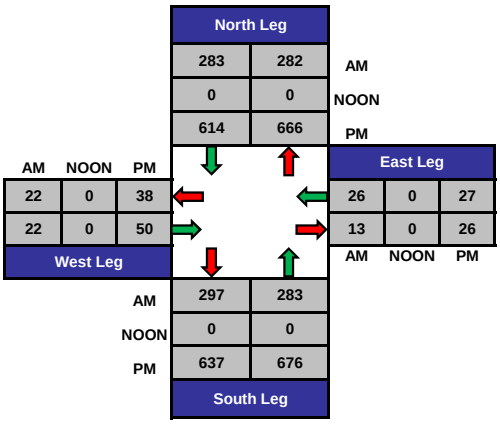
Project #: CA13_4289_017



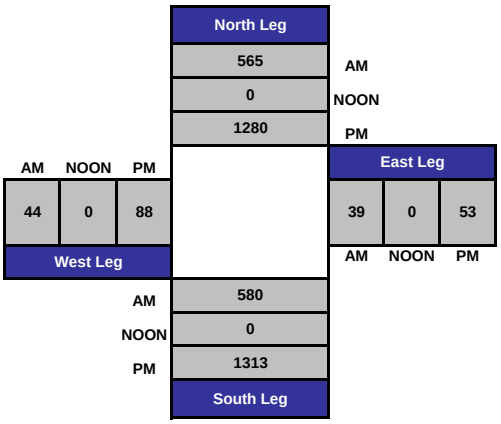
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

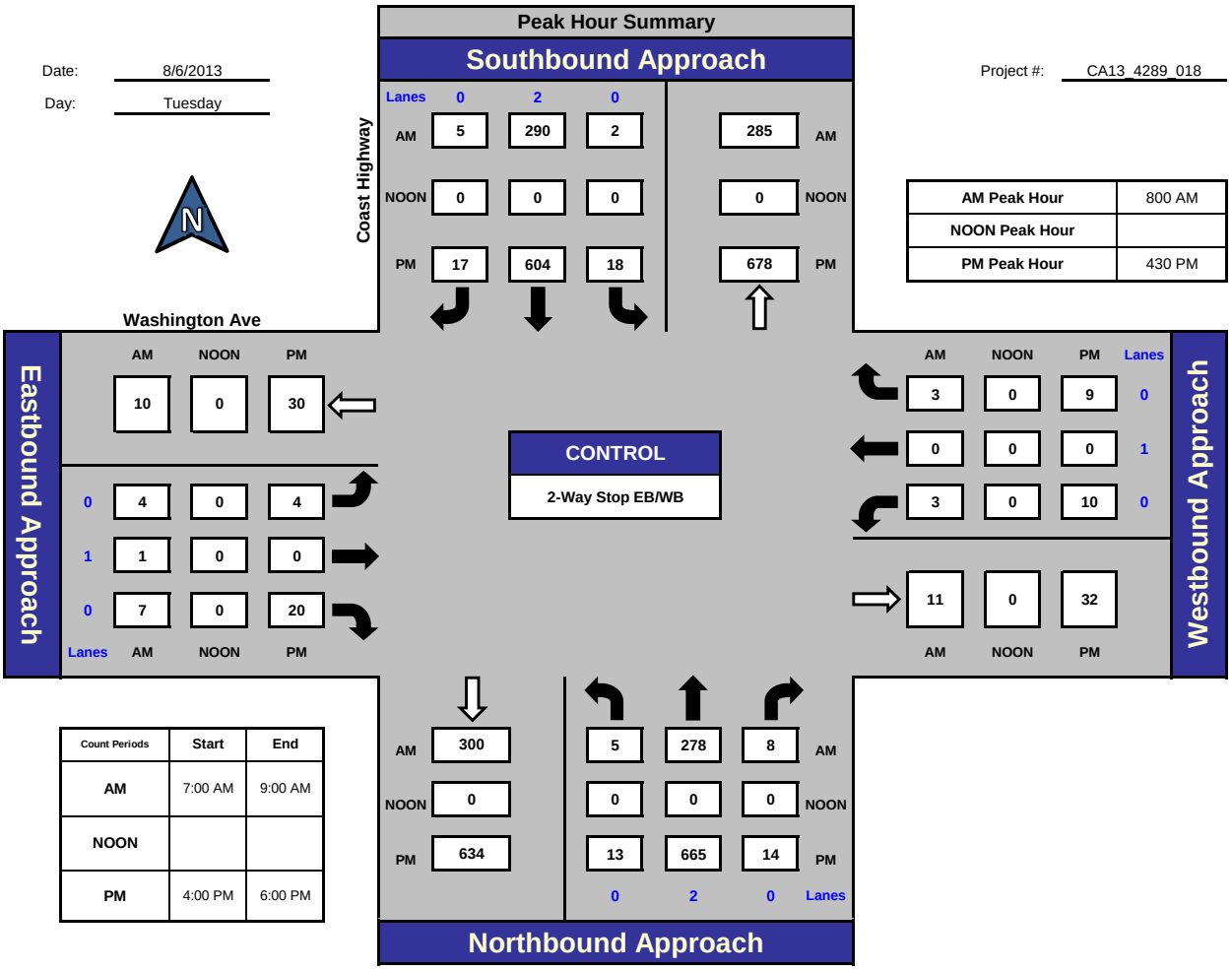
National Data & Surveying Services

Coast Highway and Washington Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

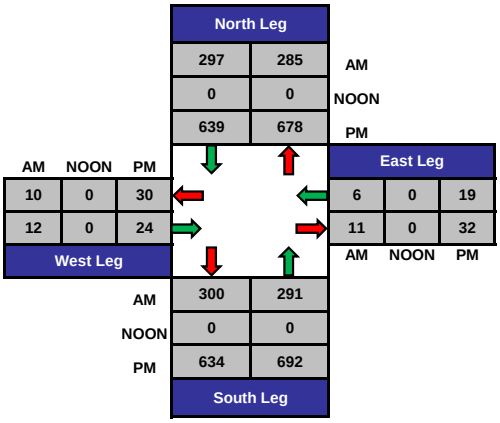
Project #: CA13_4289_018



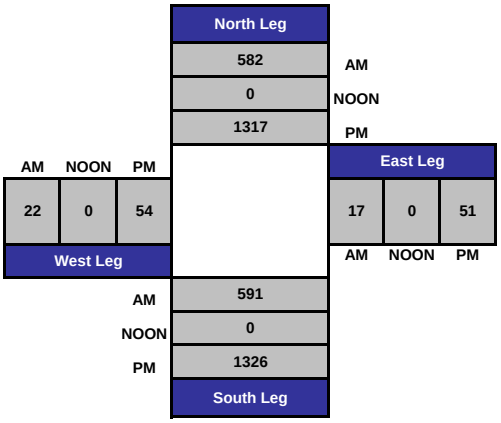
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

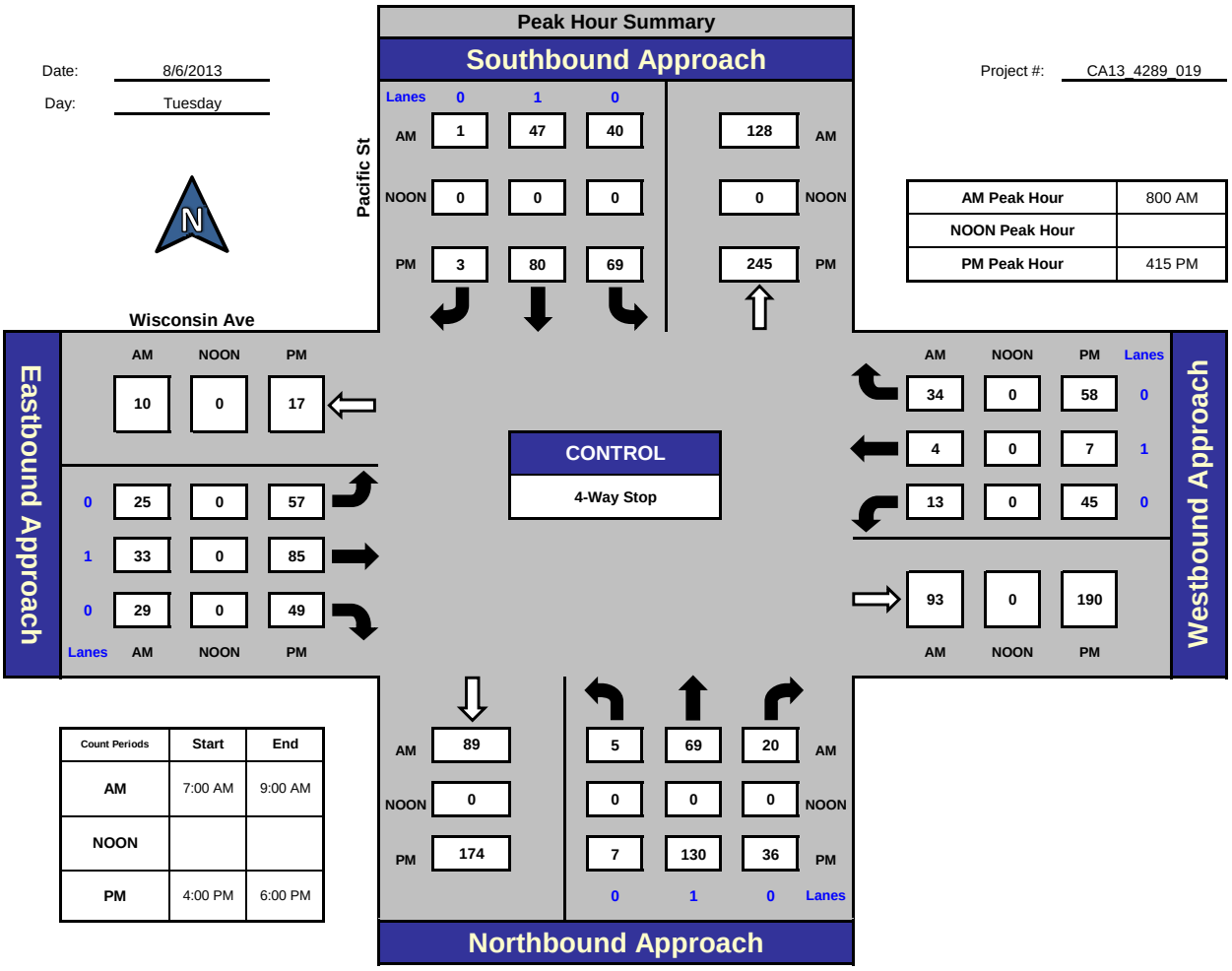
National Data & Surveying Services

Pacific St and Wisconsin Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

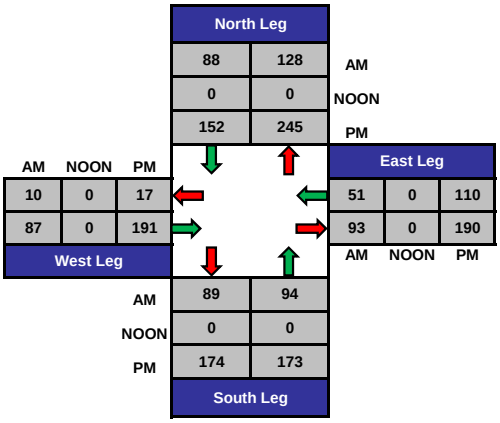
Project #: CA13_4289_019



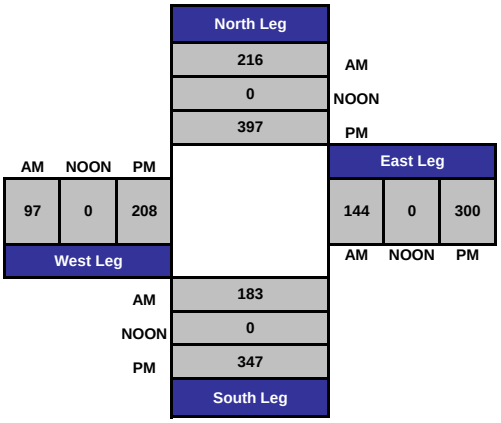
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	415 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

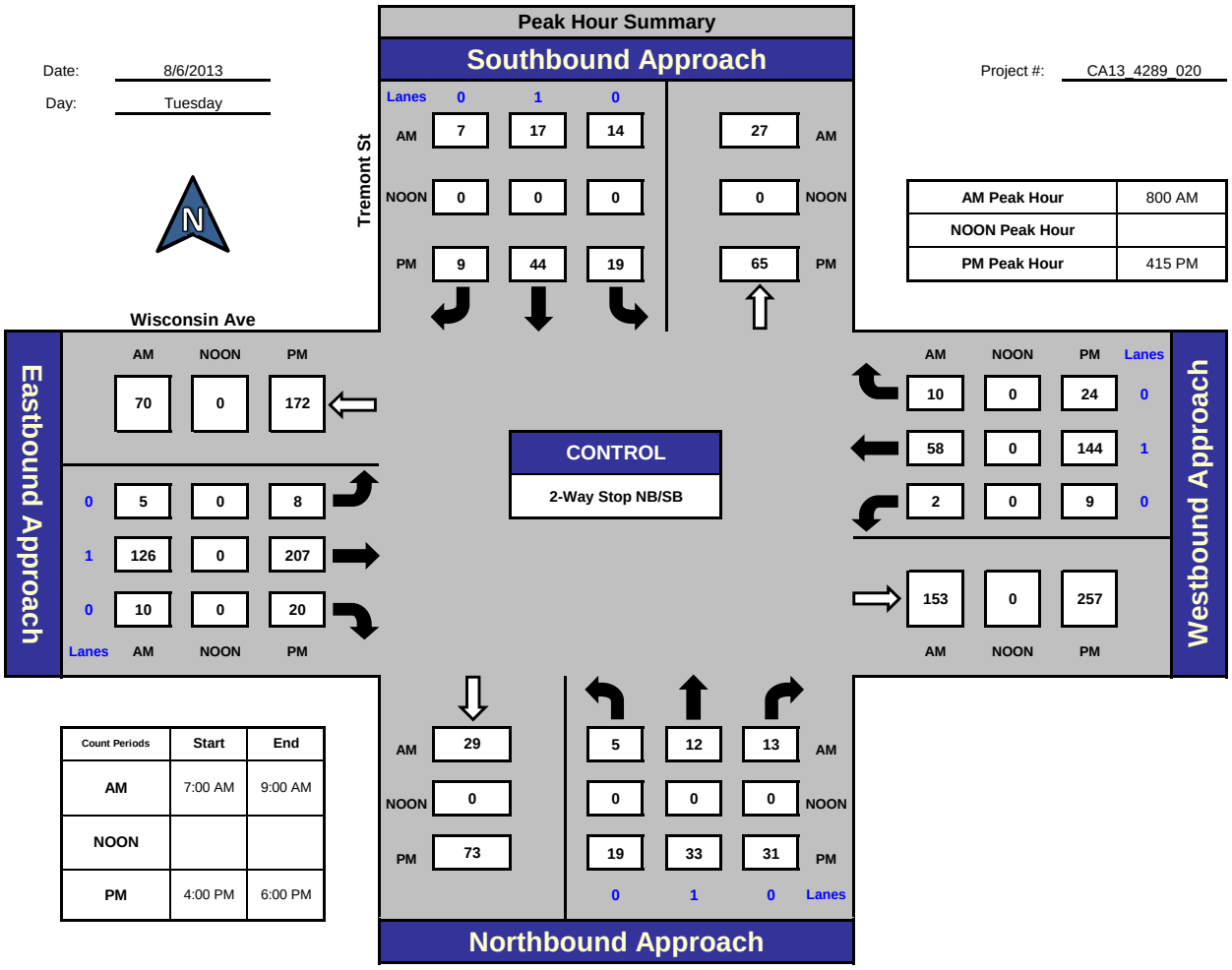
National Data & Surveying Services

Tremont St and Wisconsin Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

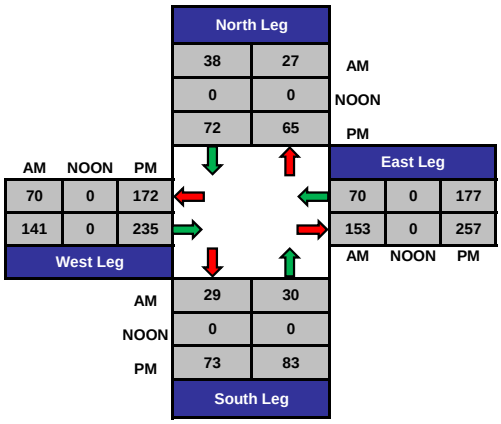
Project #: CA13_4289_020



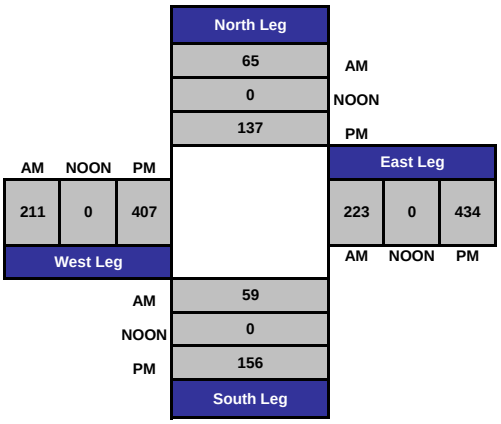
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	415 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

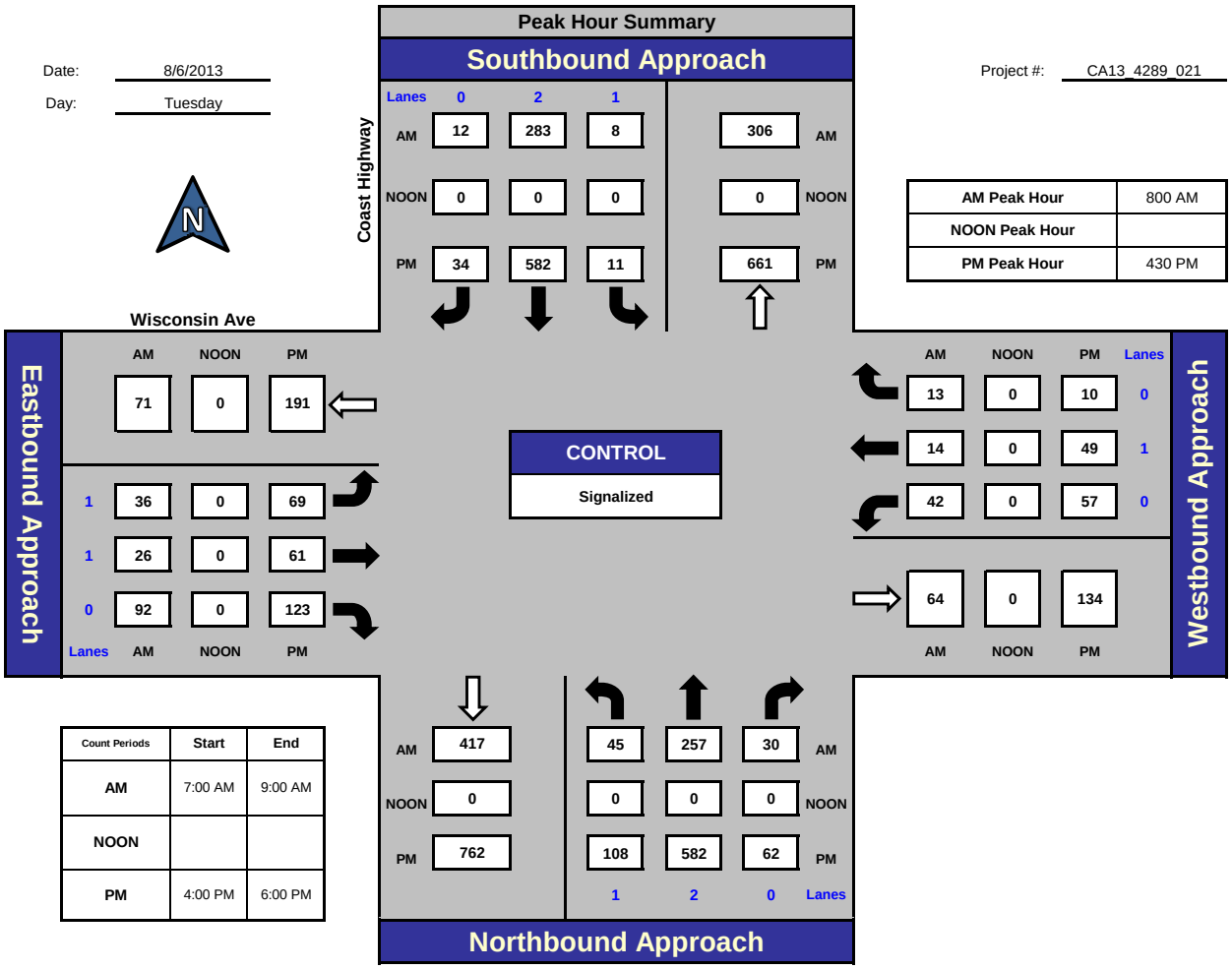
National Data & Surveying Services

Coast Highway and Wisconsin Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

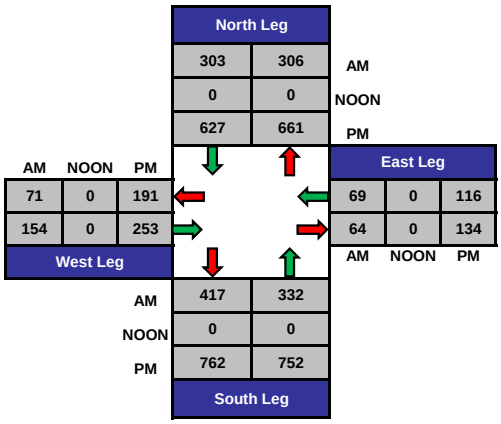
Project #: CA13_4289_021



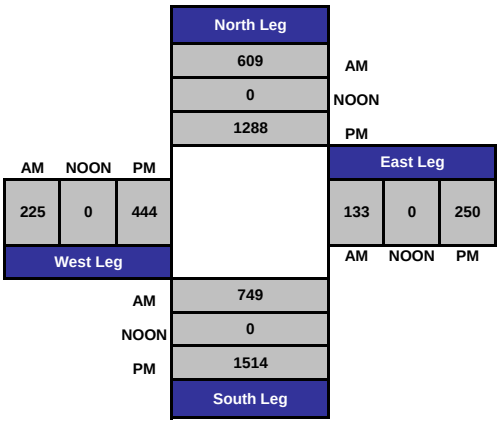
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

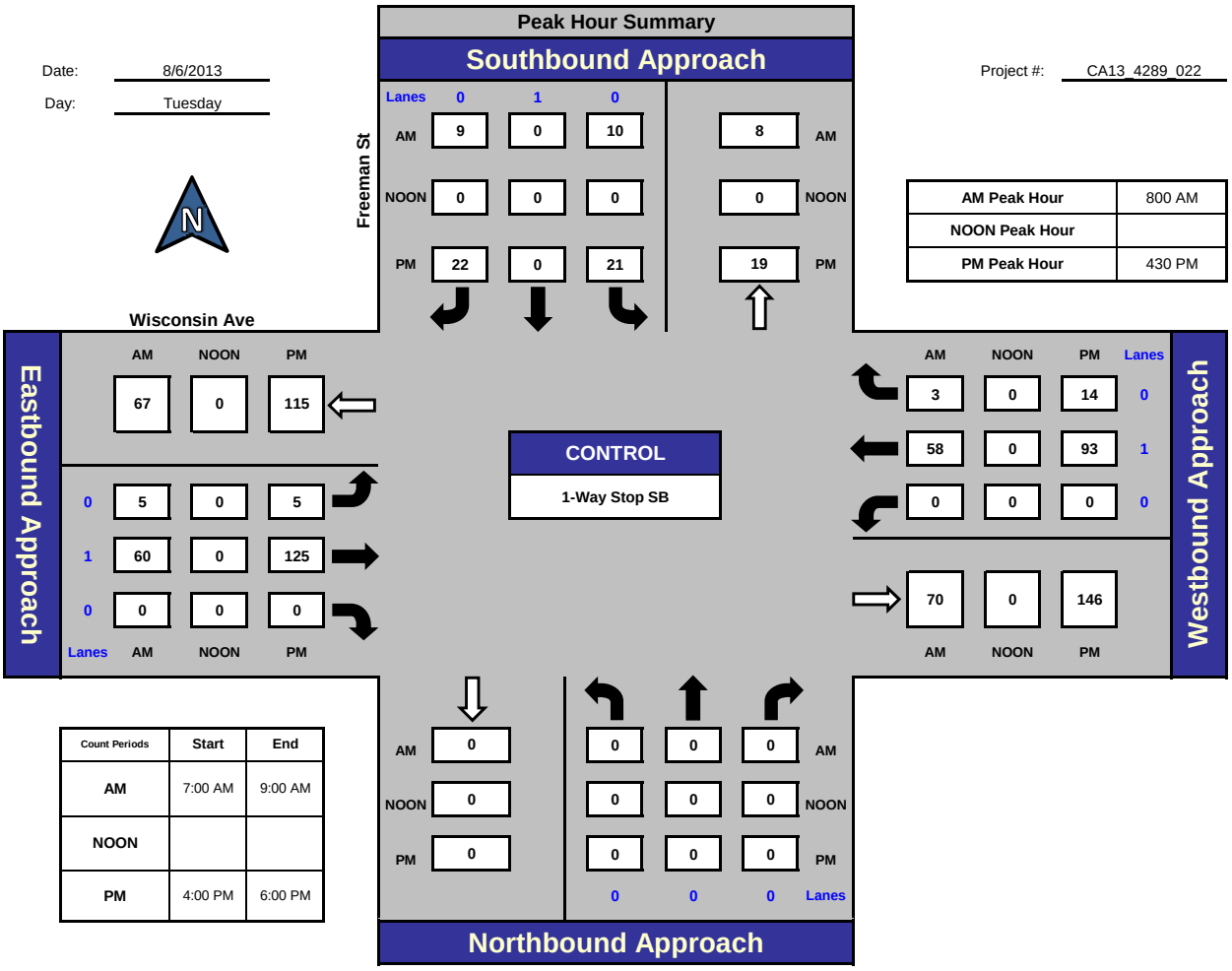
National Data & Surveying Services

Freeman St and Wisconsin Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

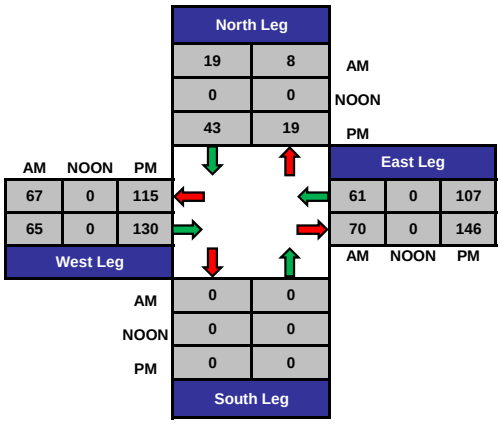
Project #: CA13_4289_022



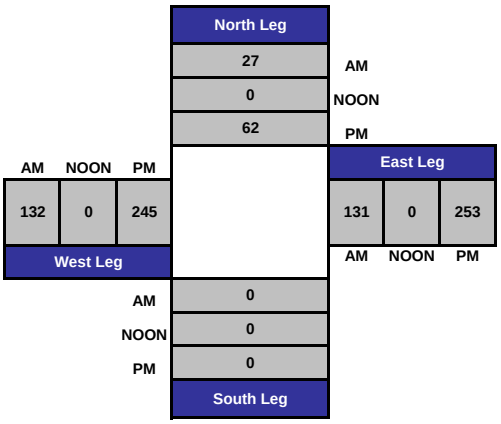
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

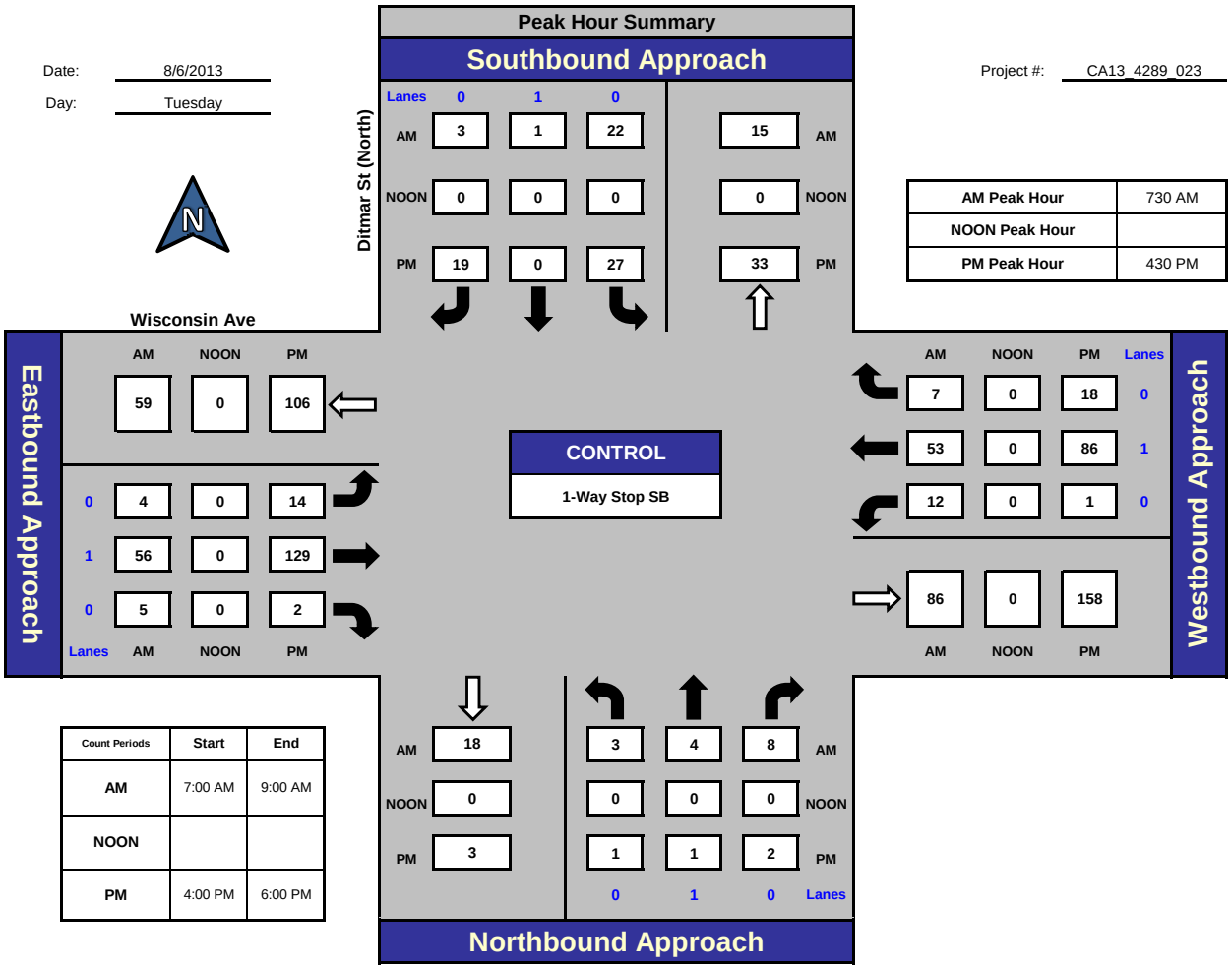
National Data & Surveying Services

Ditmar St (North) and Wisconsin Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

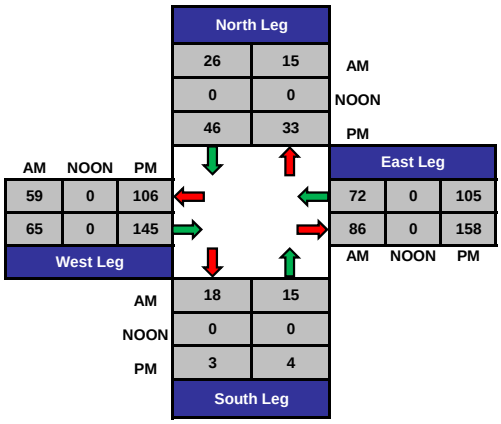
Project #: CA13_4289_023



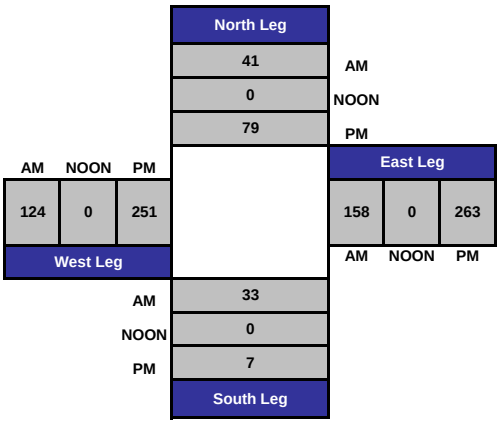
AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

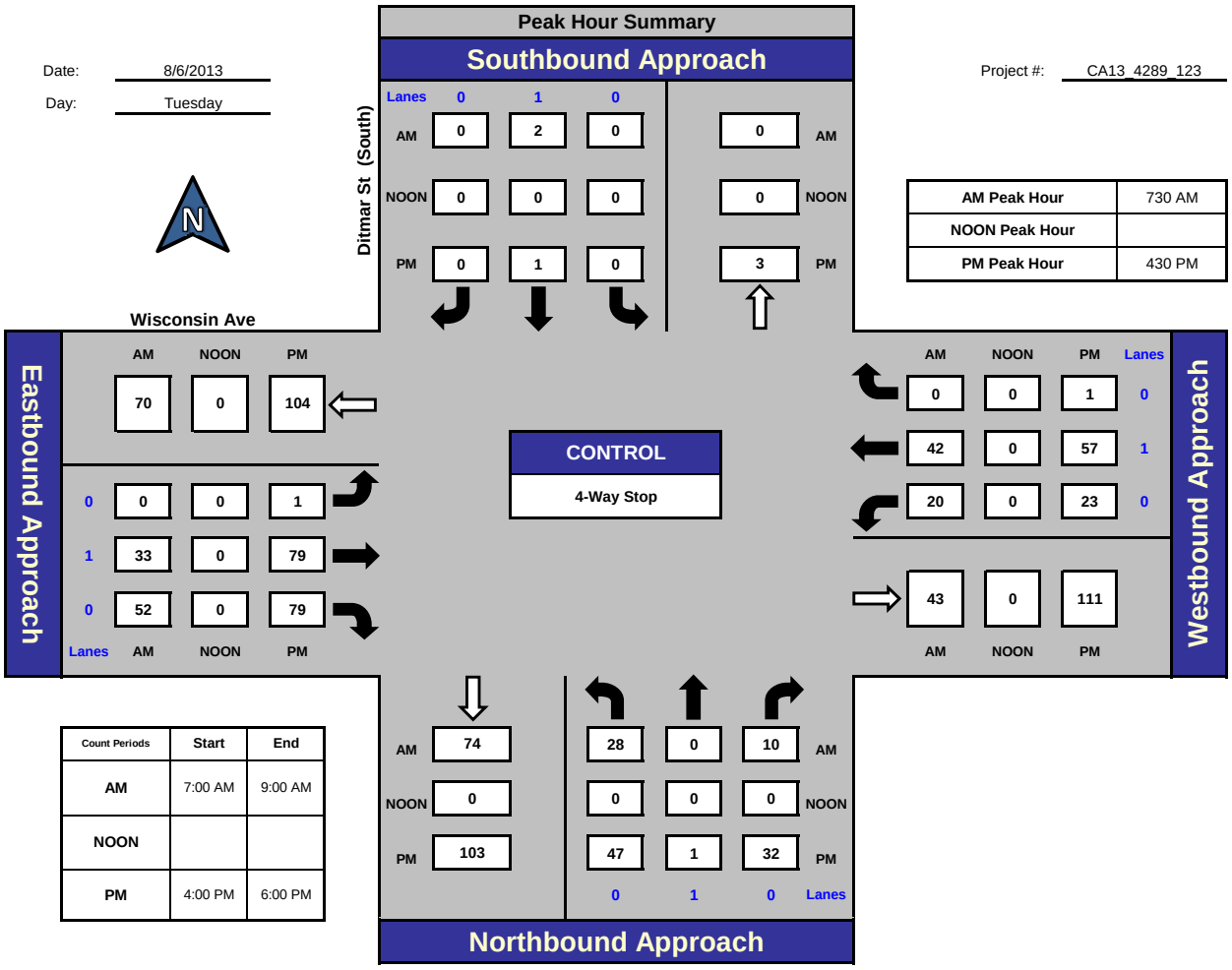
National Data & Surveying Services

Ditmar St (South) and Wisconsin Ave , City of Oceanside

Date: 8/6/2013

Day: Tuesday

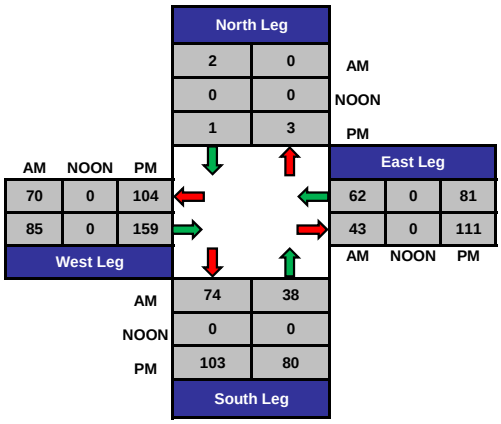
Project #: CA13_4289_123



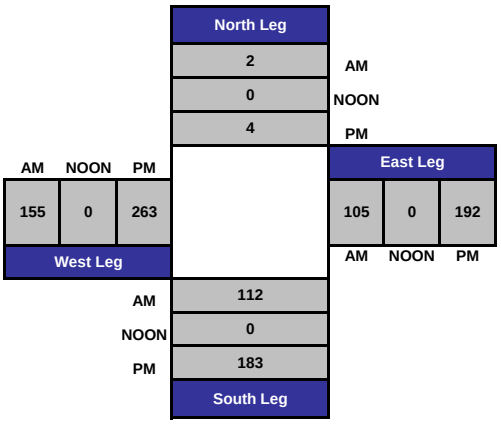
AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	430 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

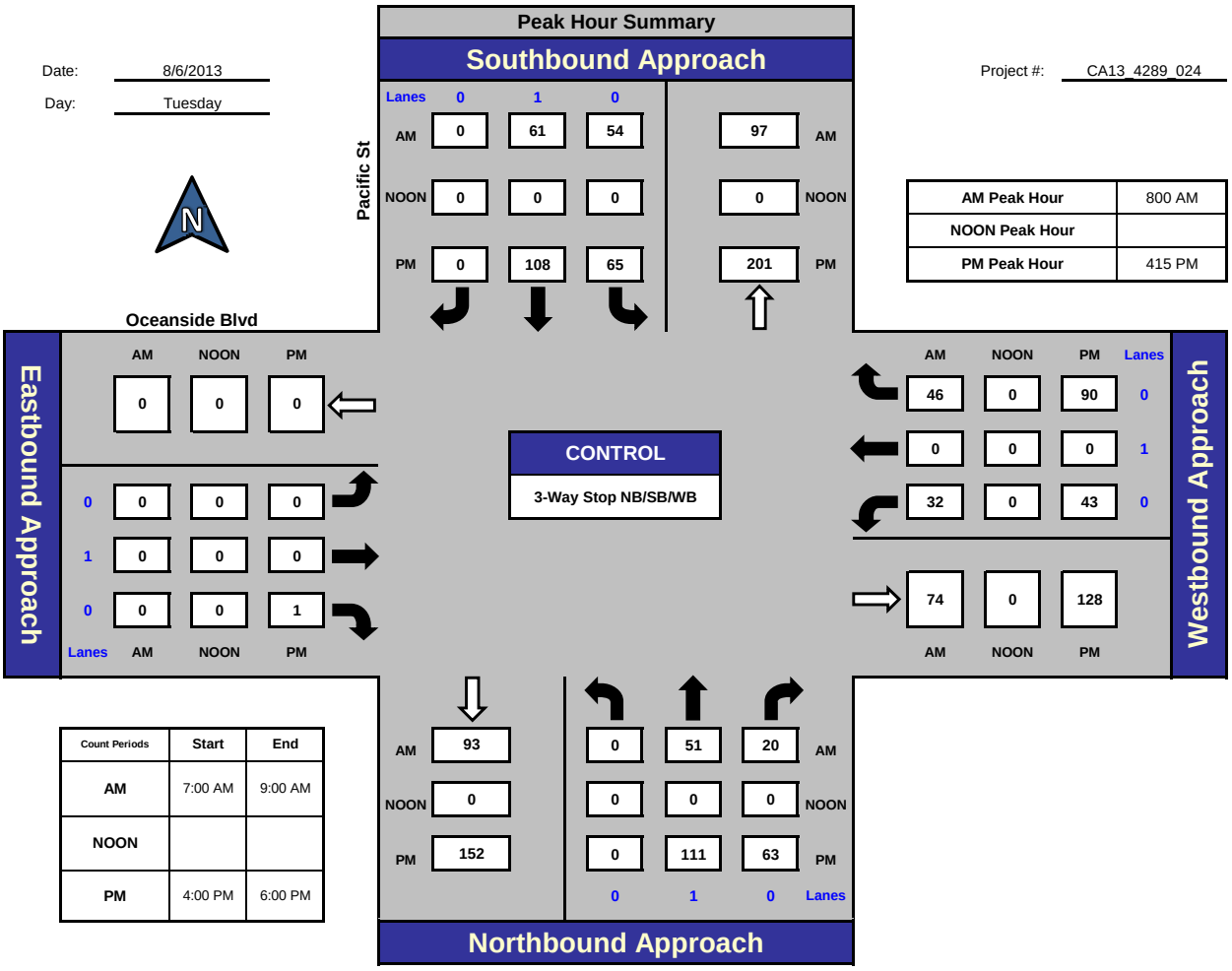
National Data & Surveying Services

Pacific St and Oceanside Blvd , City of Oceanside

Date: 8/6/2013

Day: Tuesday

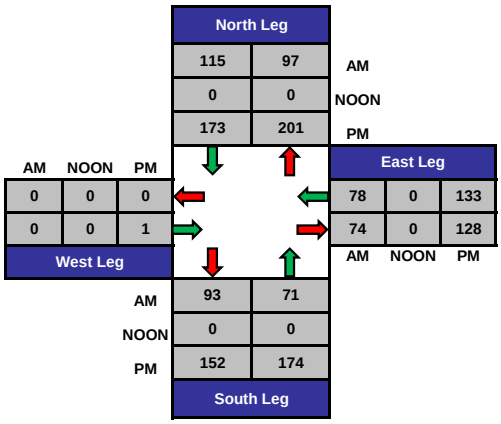
Project #: CA13_4289_024



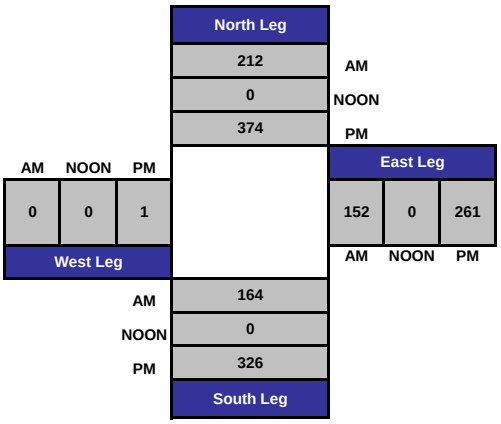
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	415 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

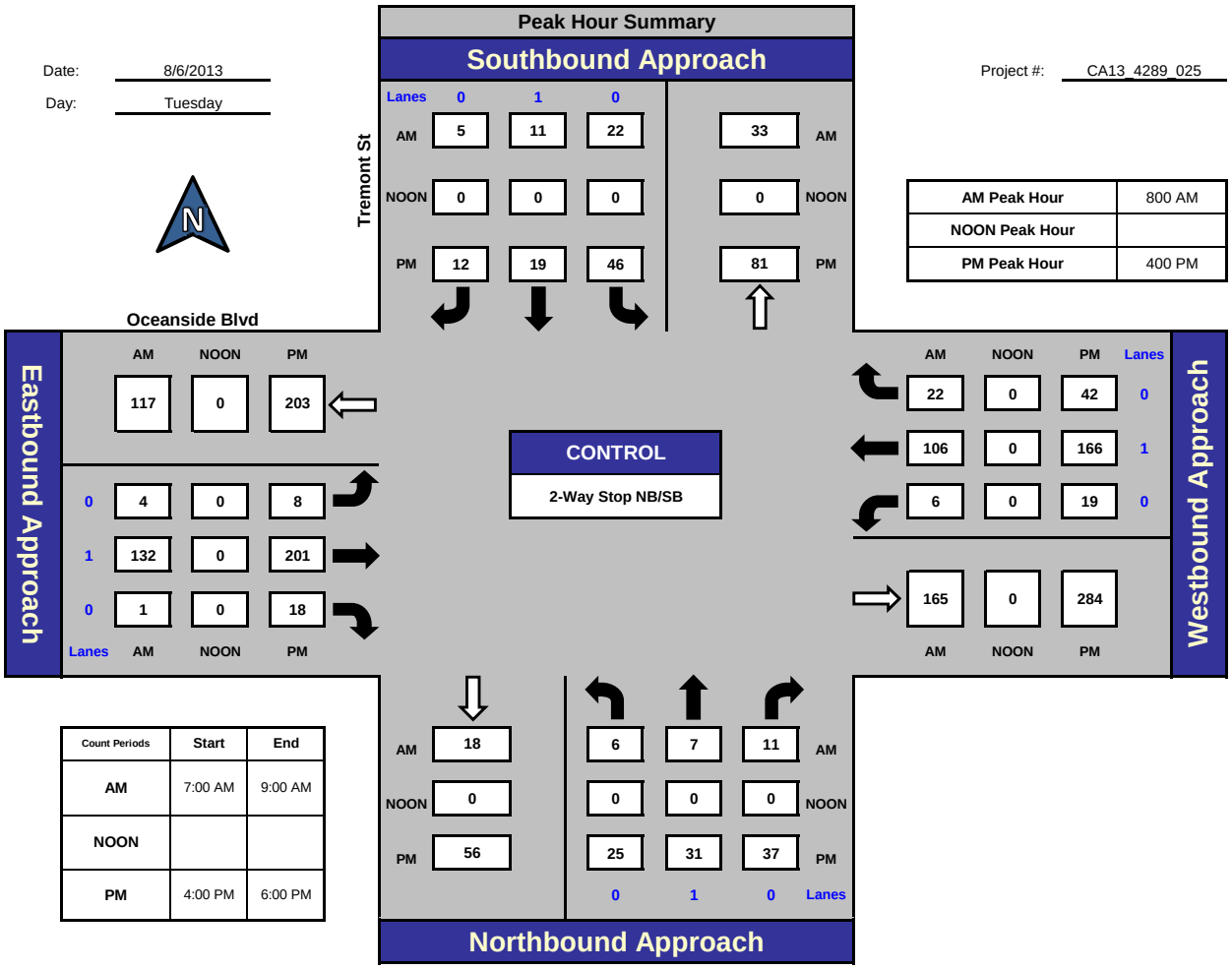
National Data & Surveying Services

Tremont St and Oceanside Blvd , City of Oceanside

Date: 8/6/2013

Day: Tuesday

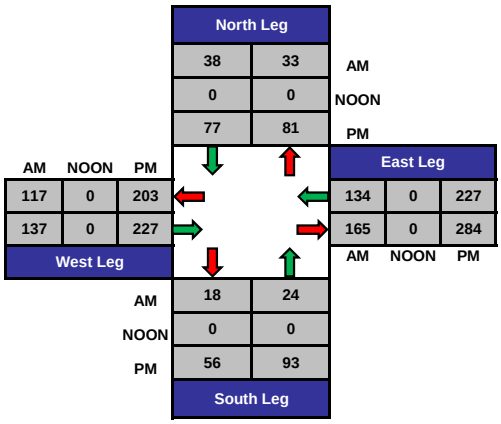
Project #: CA13_4289_025



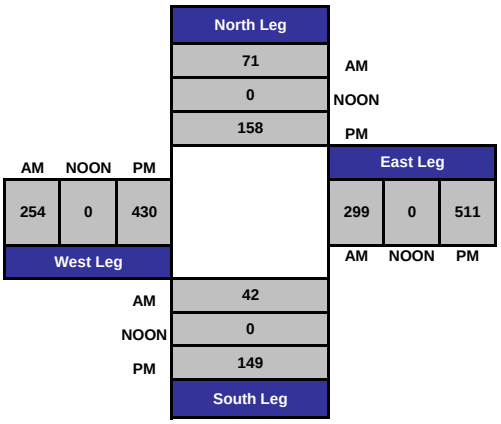
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	400 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

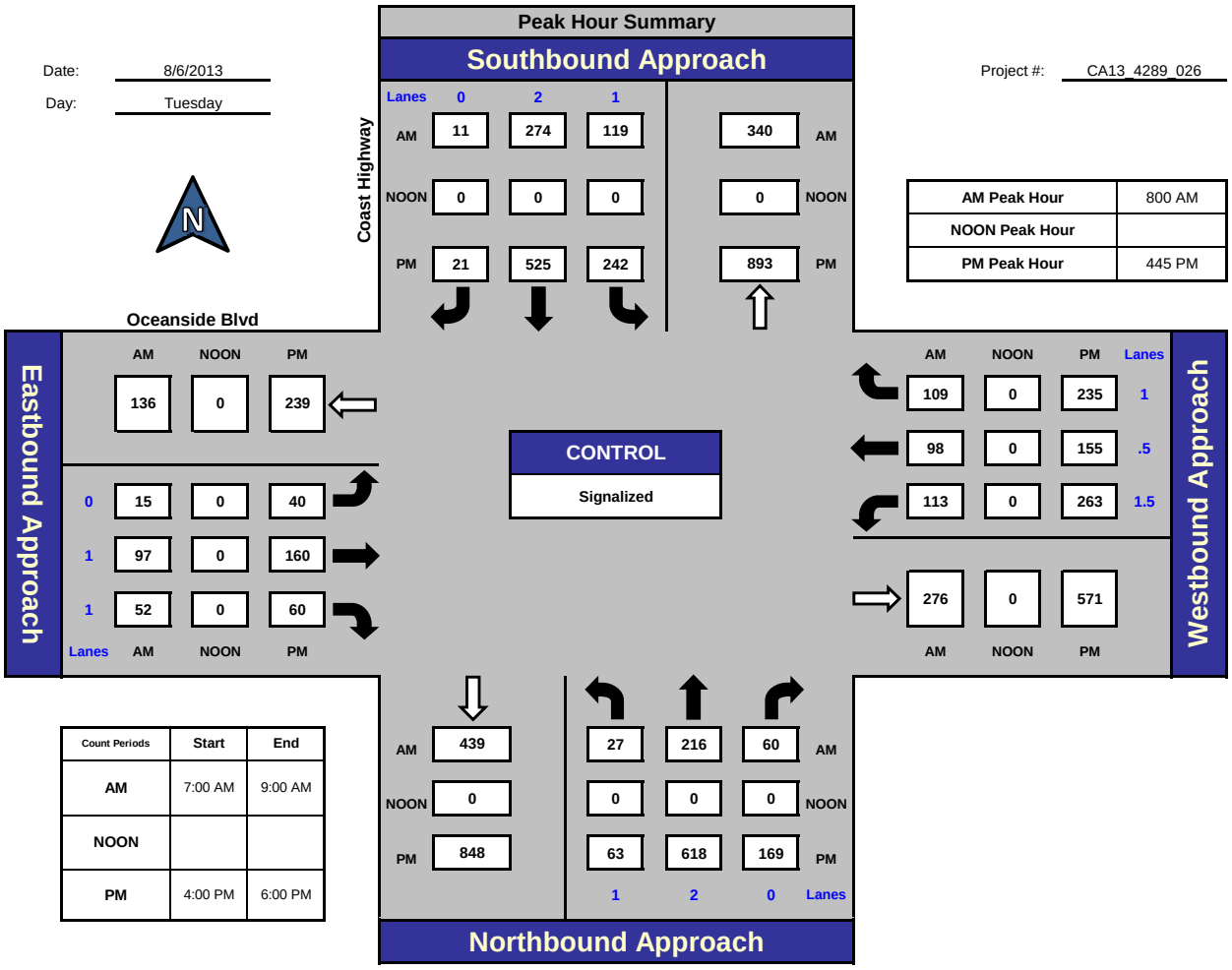
National Data & Surveying Services

Coast Highway and Oceanside Blvd , City of Oceanside

Date: 8/6/2013

Day: Tuesday

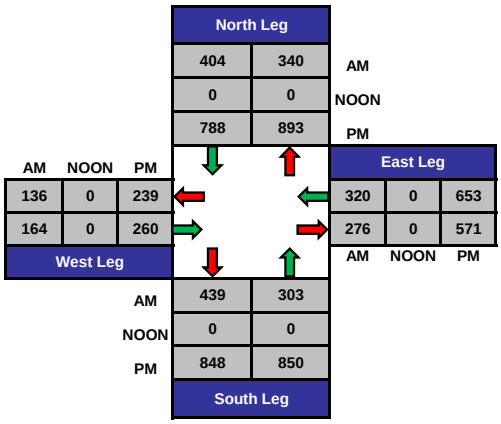
Project #: CA13_4289_026



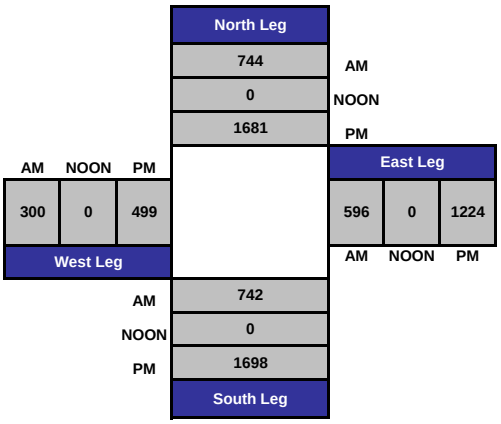
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

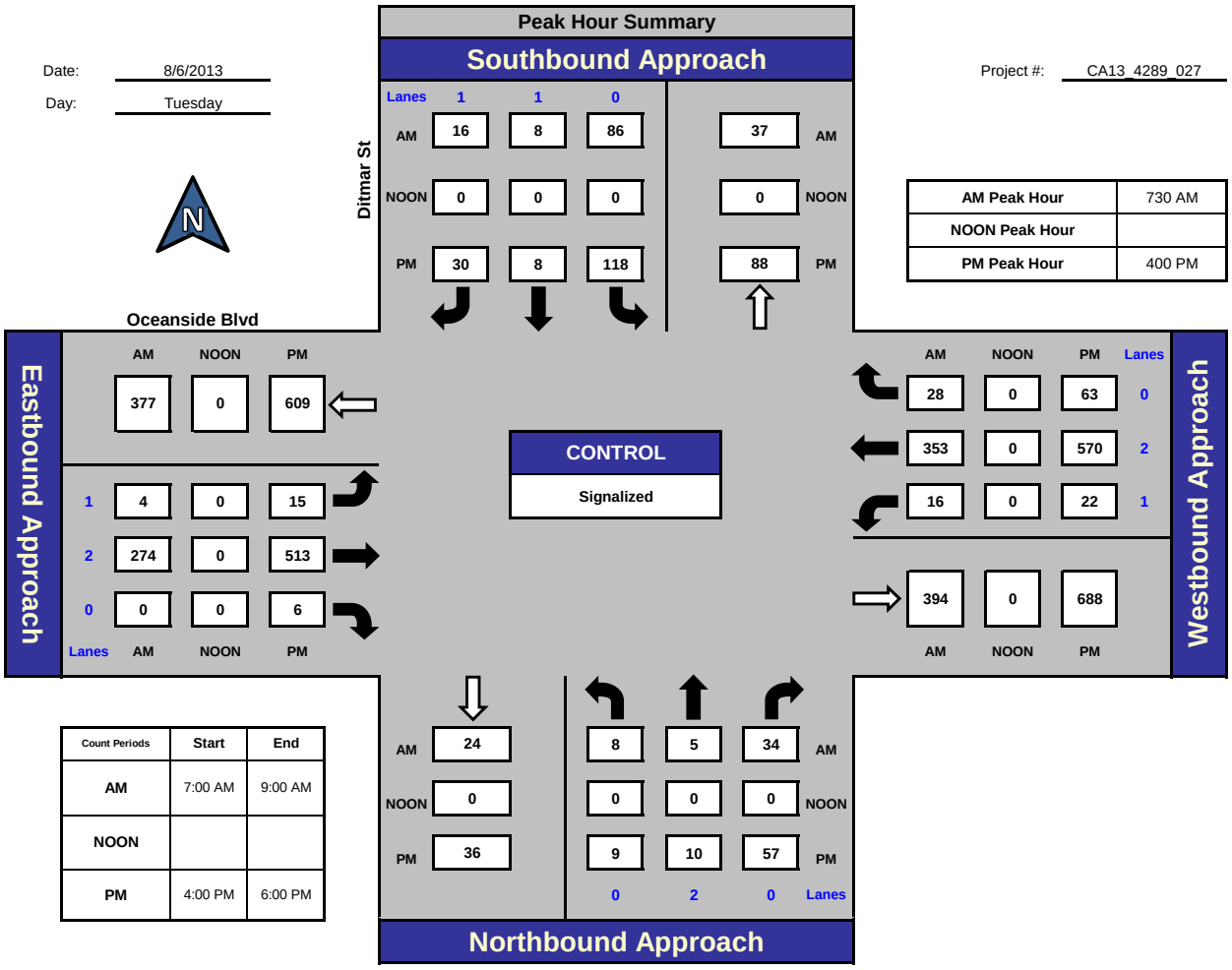
National Data & Surveying Services

Ditmar St and Oceanside Blvd , City of Oceanside

Date: 8/6/2013

Day: Tuesday

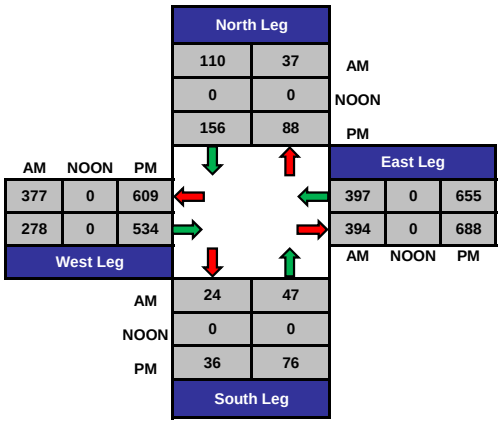
Project #: CA13_4289_027



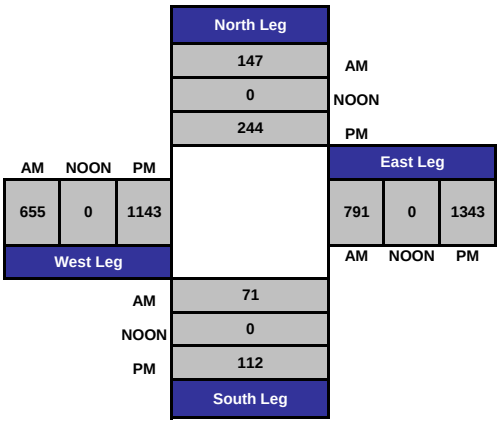
AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	400 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

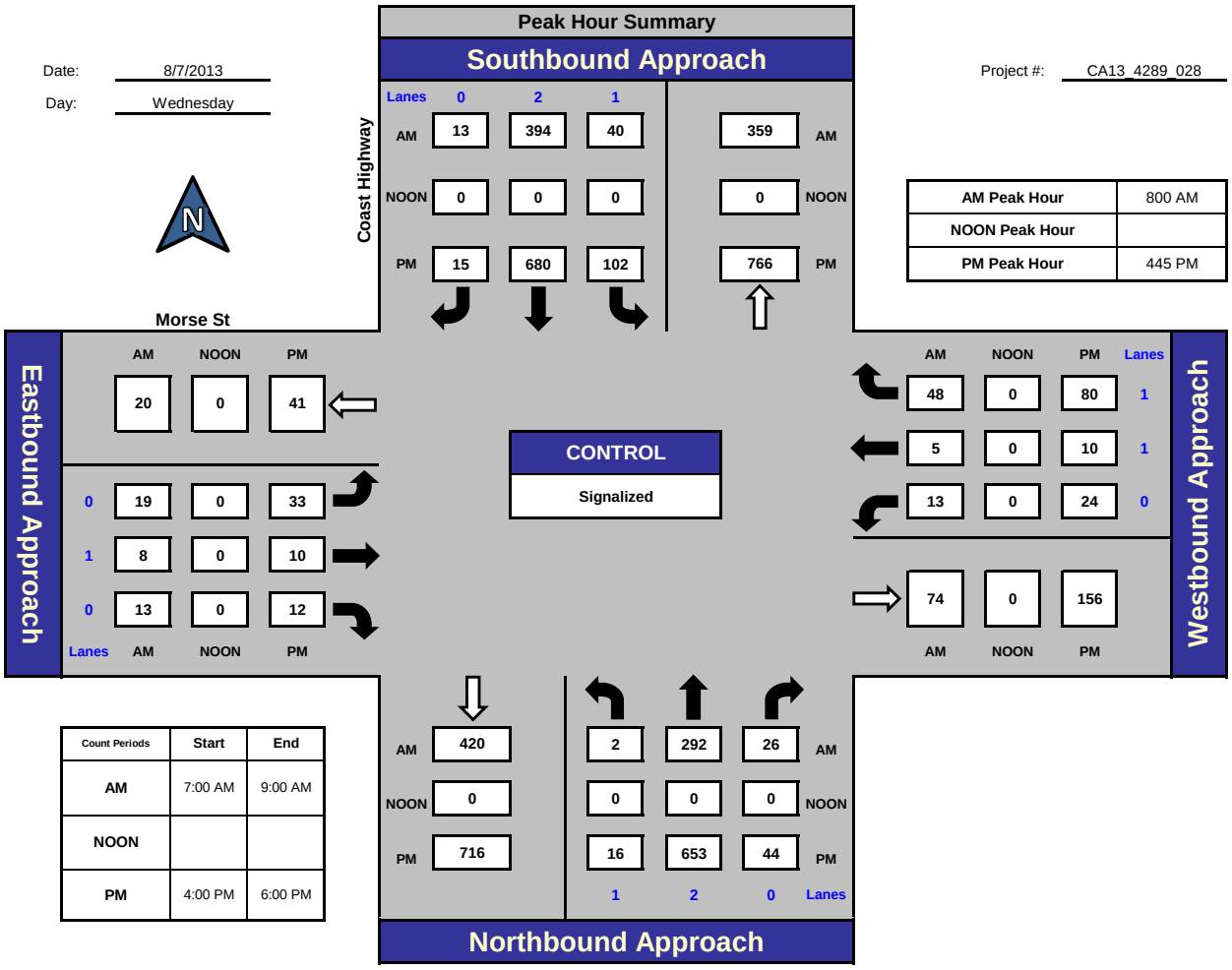
National Data & Surveying Services

Coast Highway and Morse St , City of Oceanside

Date: 8/7/2013

Day: Wednesday

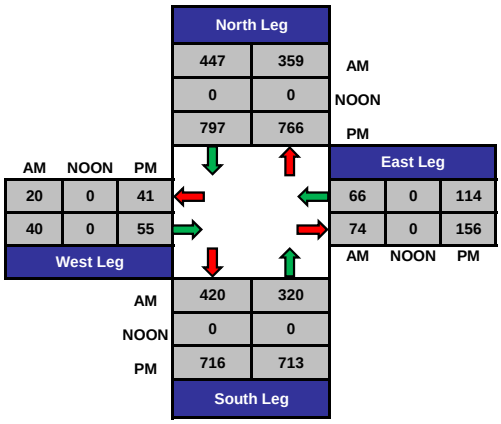
Project #: CA13_4289_028



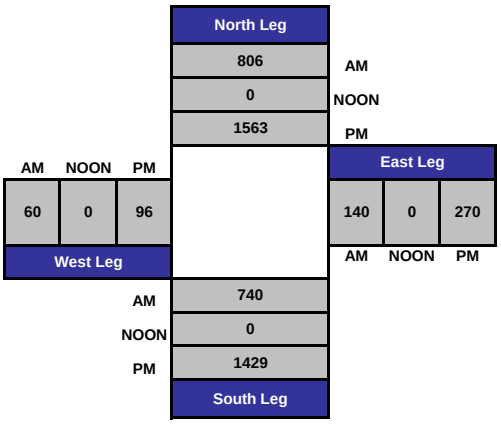
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Freeman St and Morse St , City of Oceanside

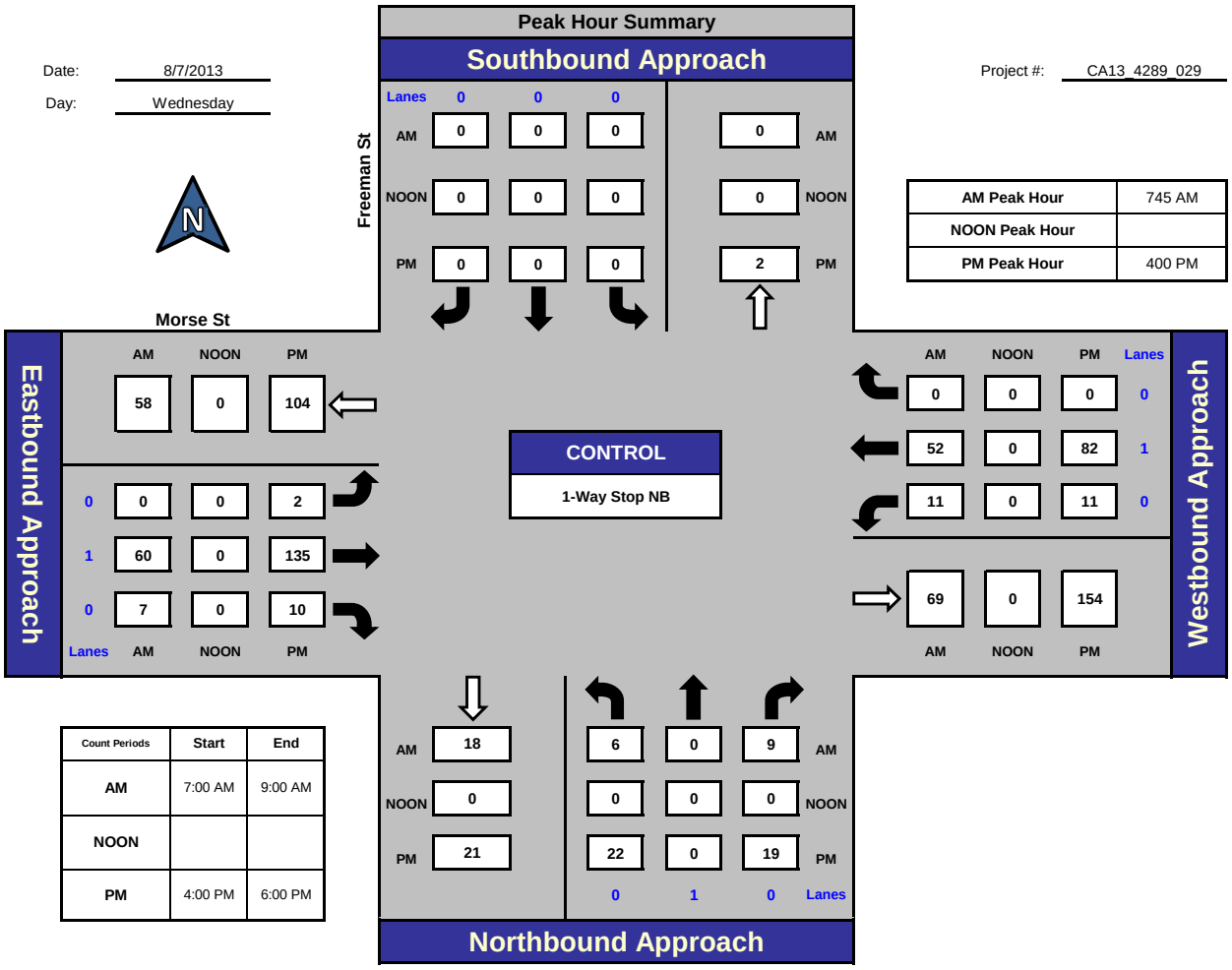
Date: 8/7/2013

Day: Wednesday

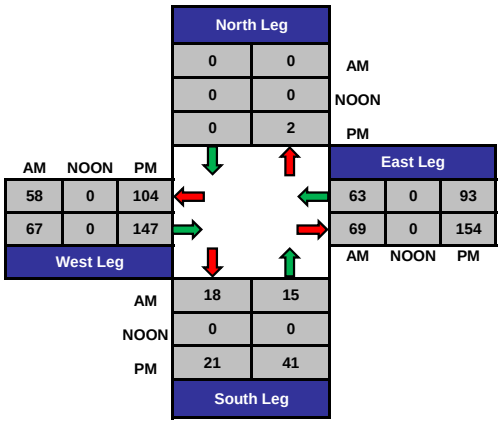
Project #: CA13_4289_029

AM Peak Hour	745 AM
NOON Peak Hour	
PM Peak Hour	400 PM

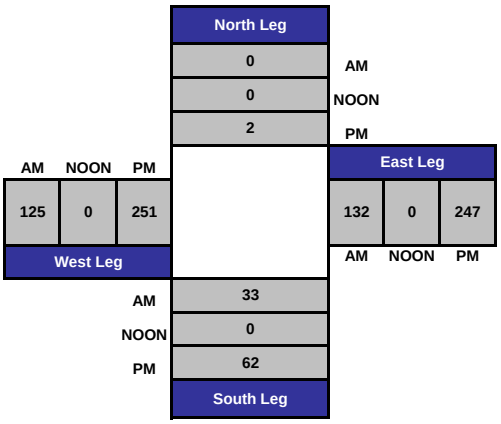
Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM



Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Ditmar St and Morse St , City of Oceanside

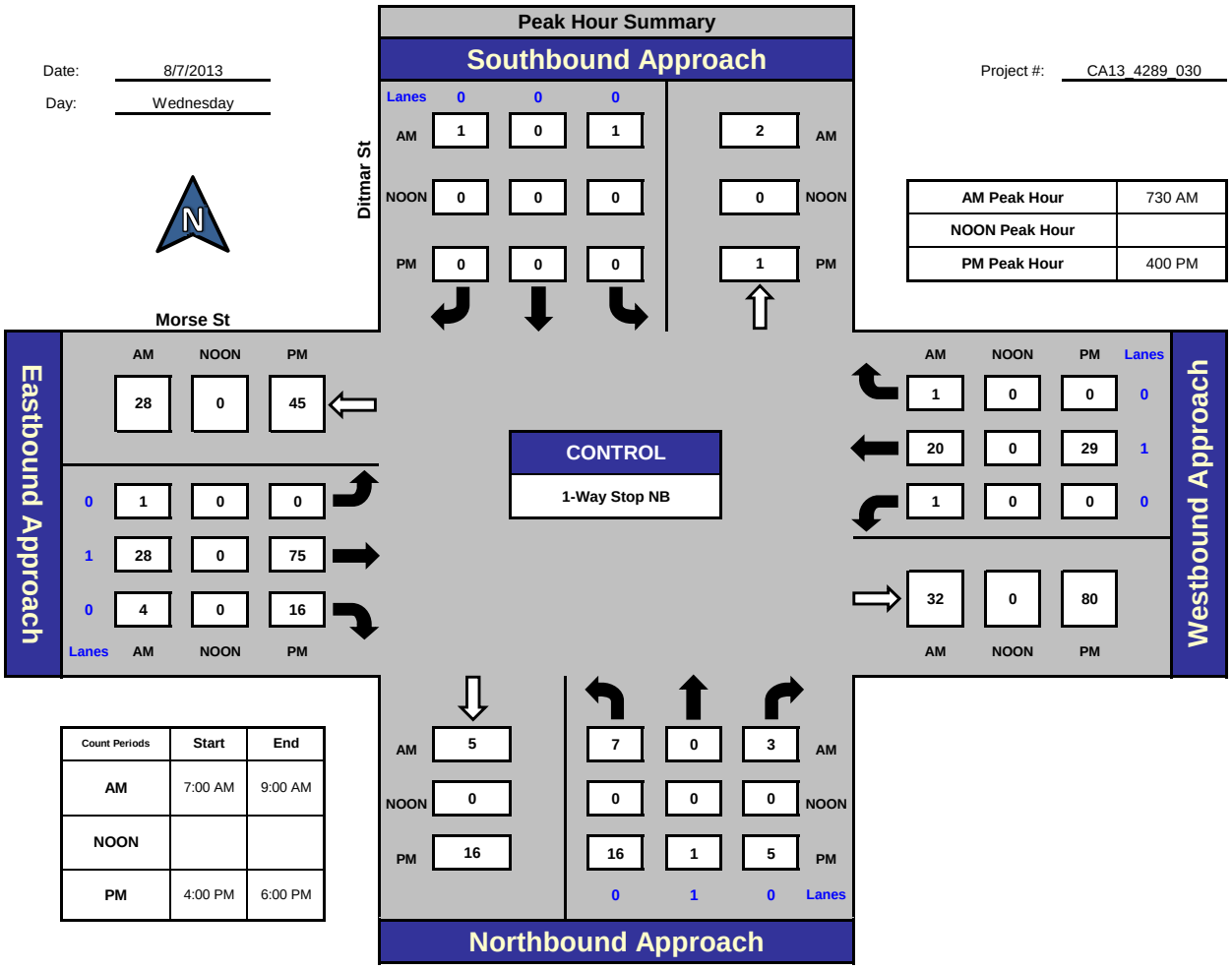
Date: 8/7/2013

Day: Wednesday

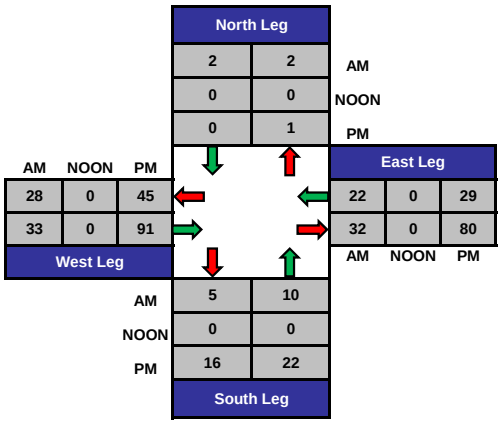
Project #: CA13_4289_030

AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	400 PM

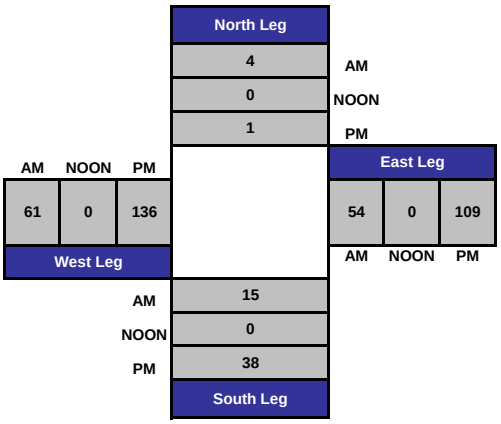
Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM



Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

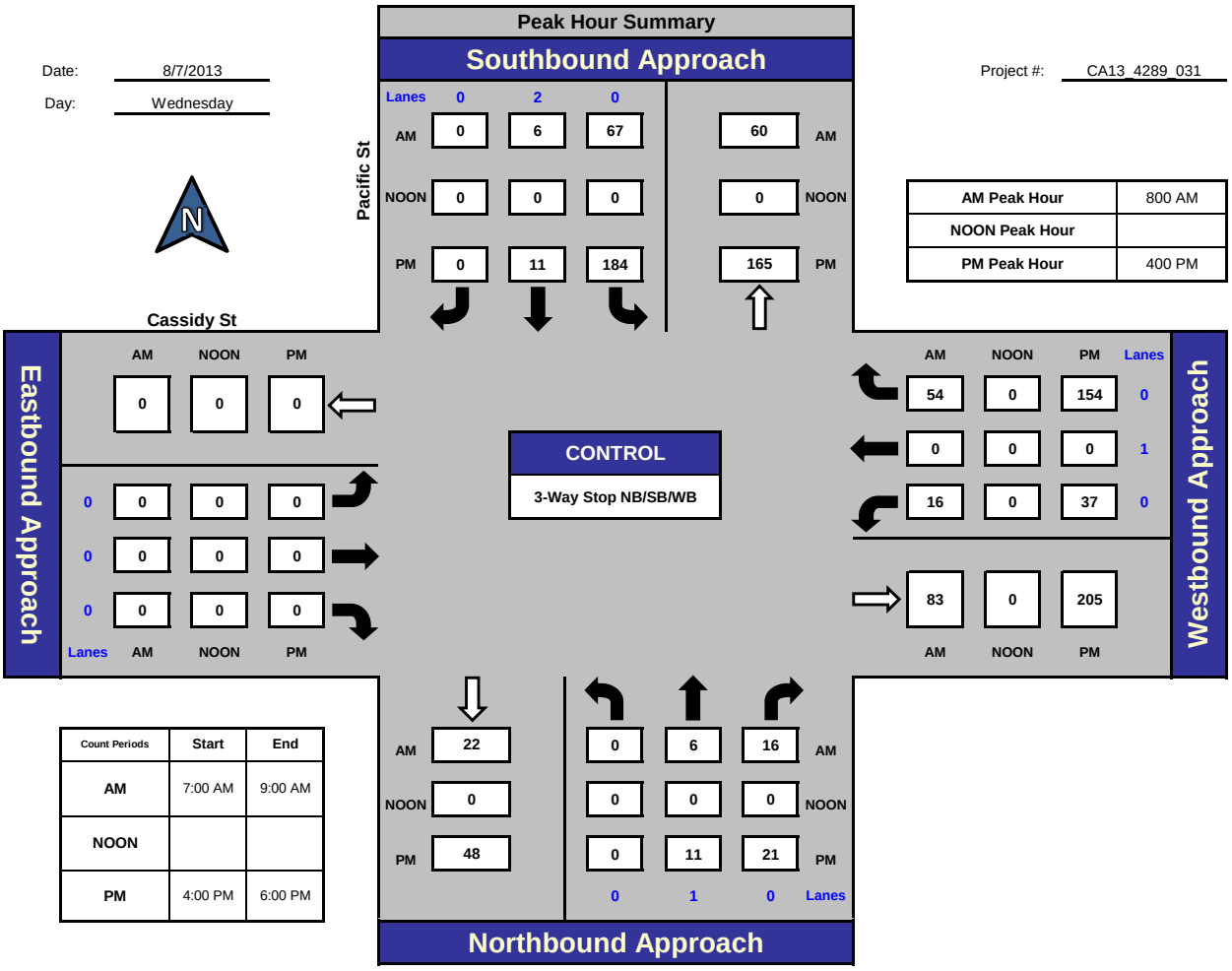
National Data & Surveying Services

Pacific St and Cassidy St , City of Oceanside

Date: 8/7/2013

Day: Wednesday

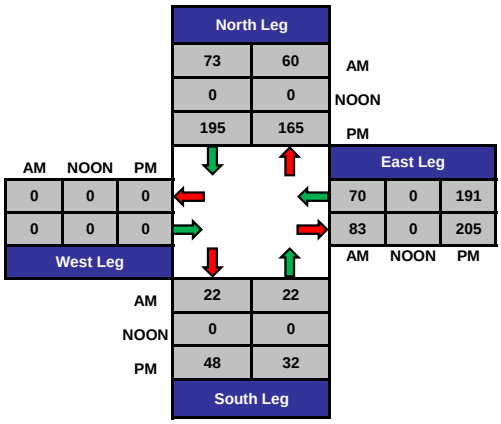
Project #: CA13_4289_031



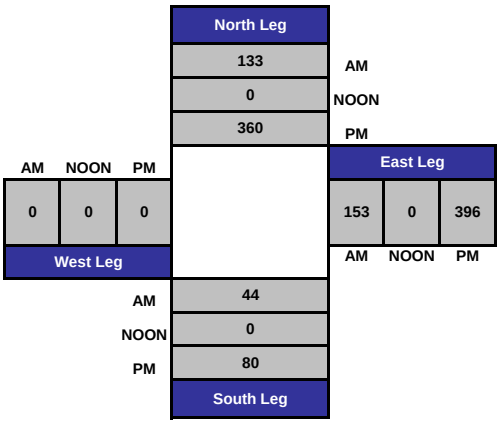
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	400 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

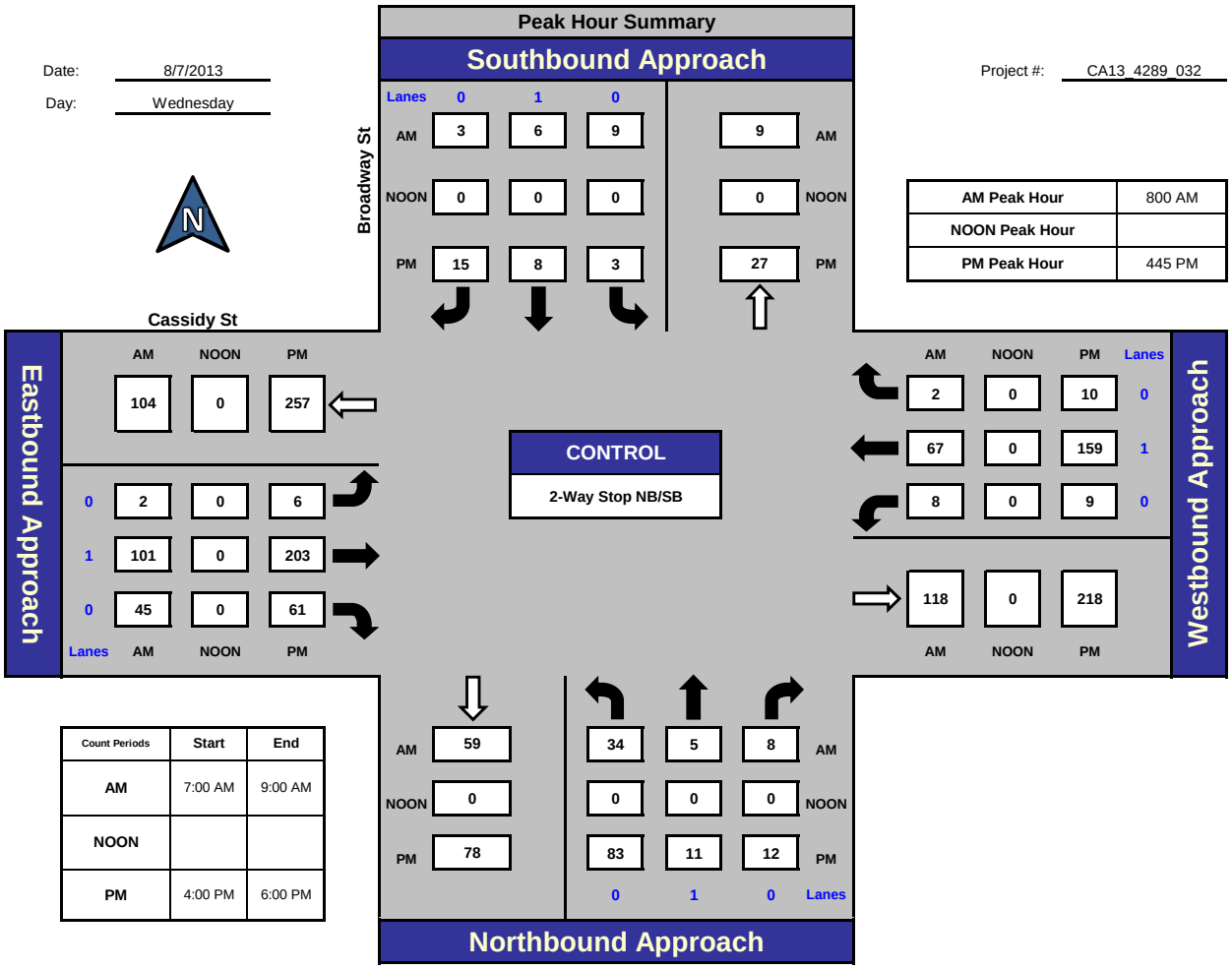
National Data & Surveying Services

Broadway St and Cassidy St , City of Oceanside

Date: 8/7/2013

Day: Wednesday

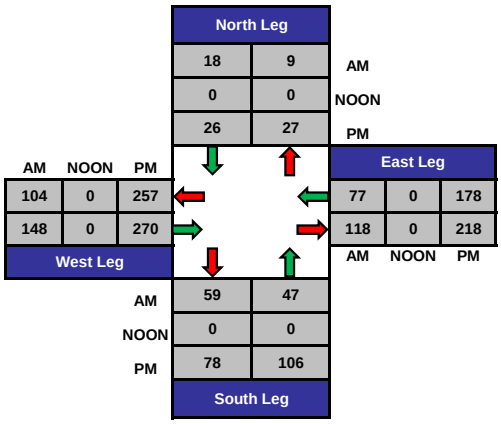
Project #: CA13_4289_032



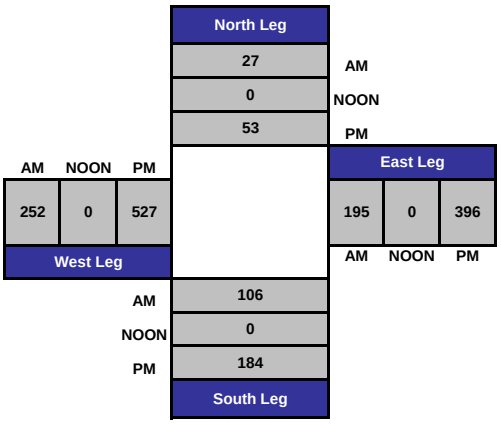
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

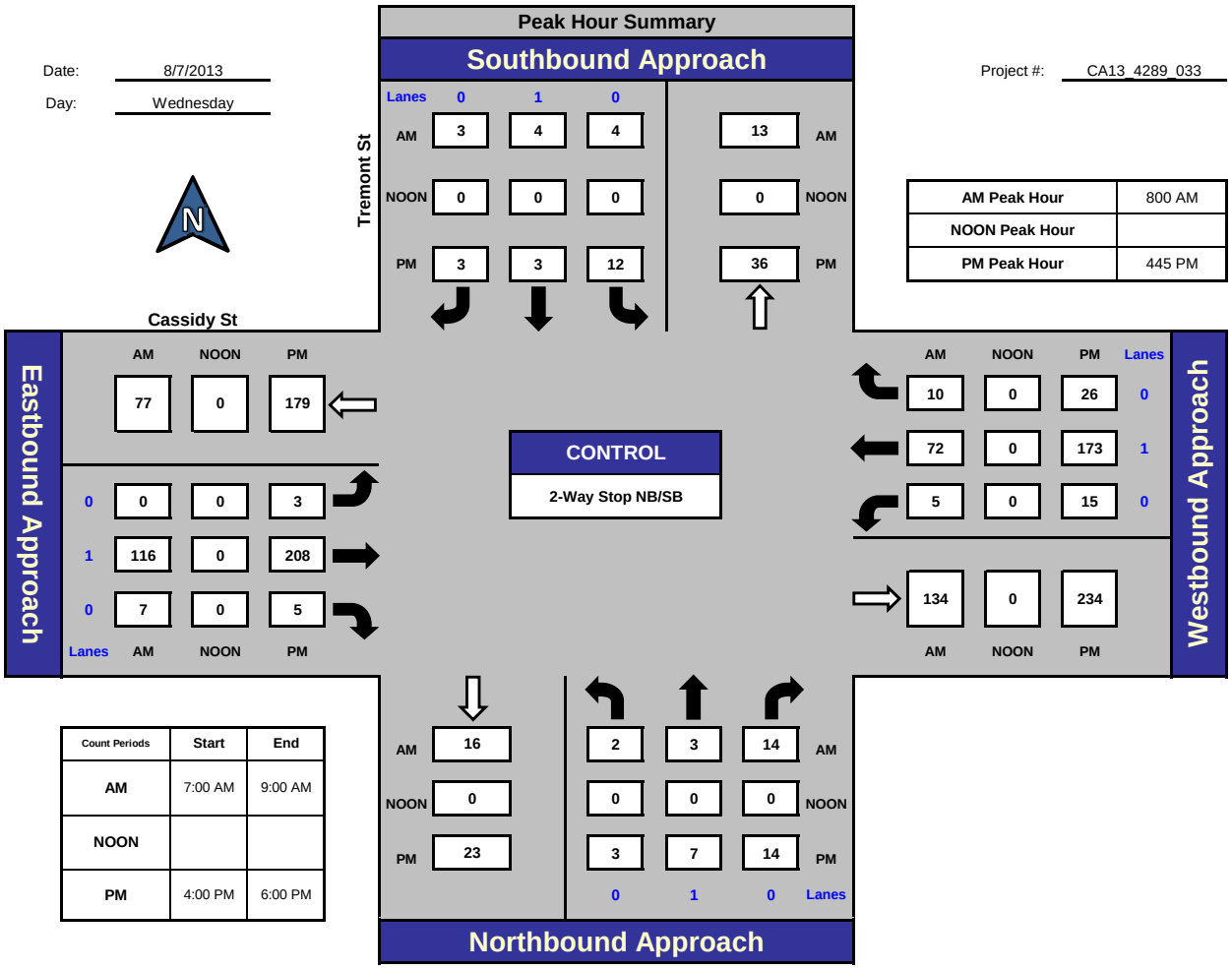
National Data & Surveying Services

Tremont St and Cassidy St , City of Oceanside

Date: 8/7/2013

Day: Wednesday

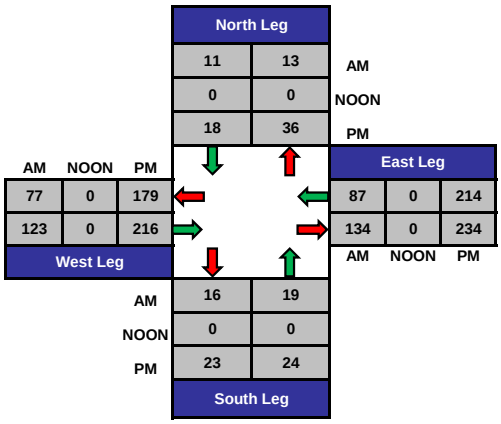
Project #: CA13_4289_033



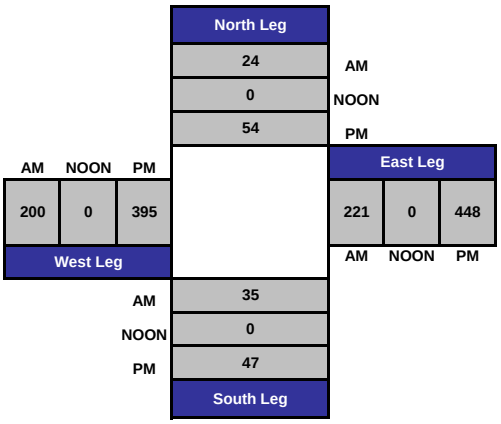
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

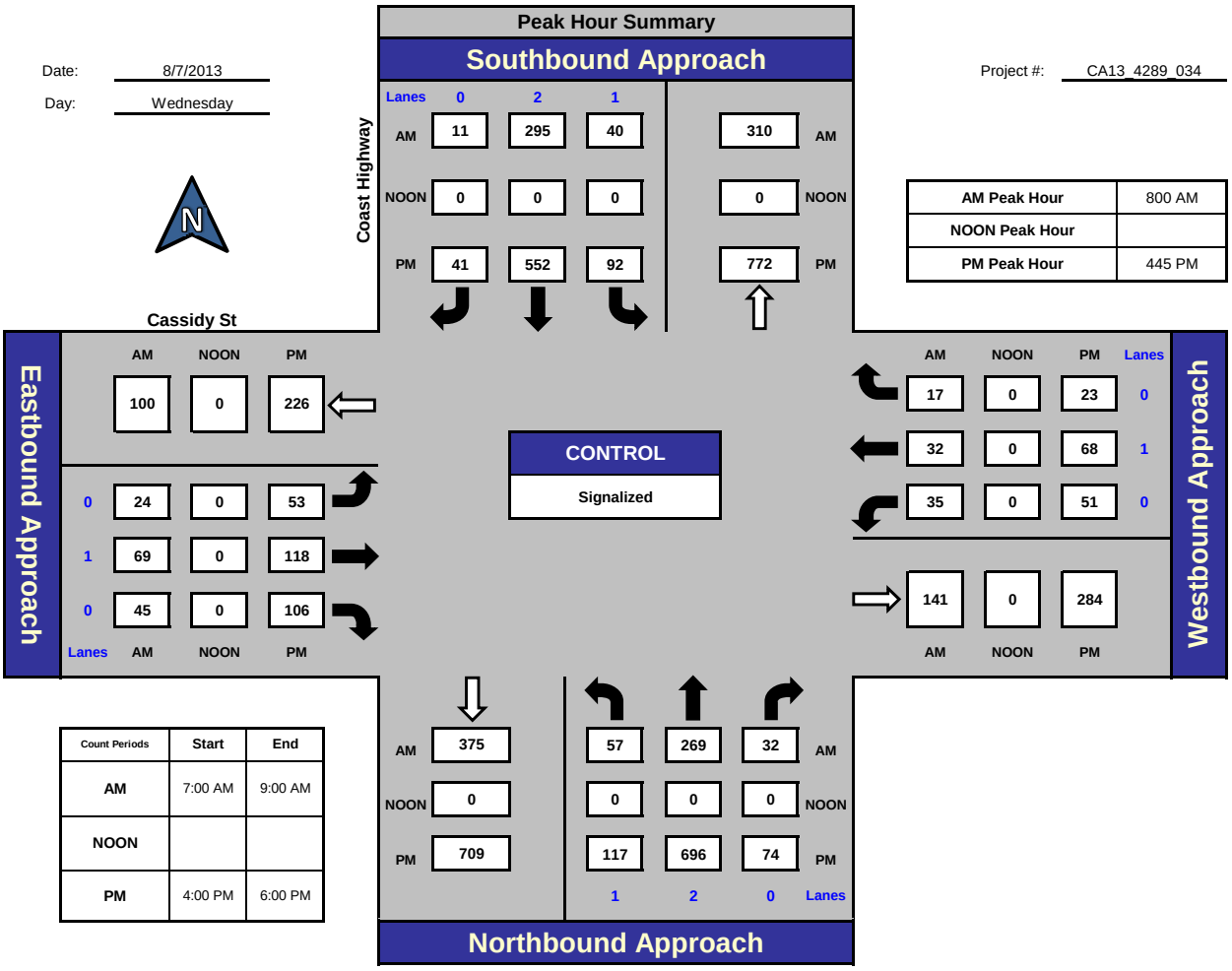
National Data & Surveying Services

Coast Highway and Cassidy St , City of Oceanside

Date: 8/7/2013

Day: Wednesday

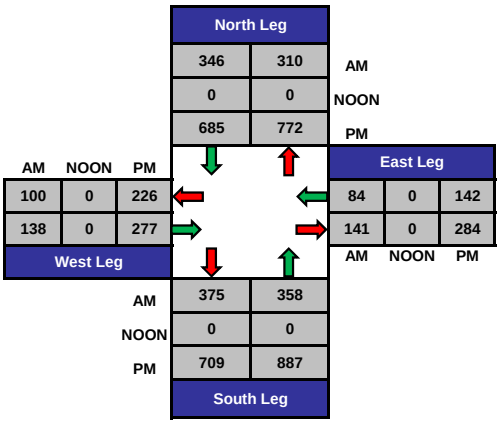
Project #: CA13_4289_034



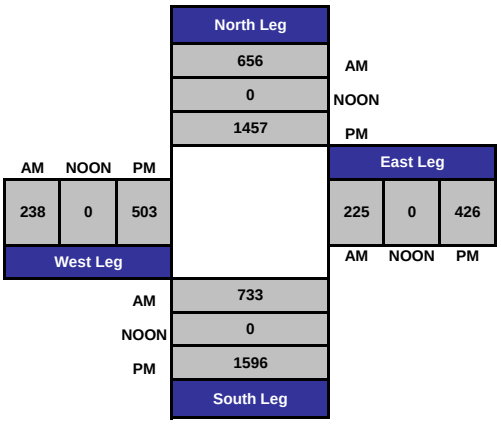
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

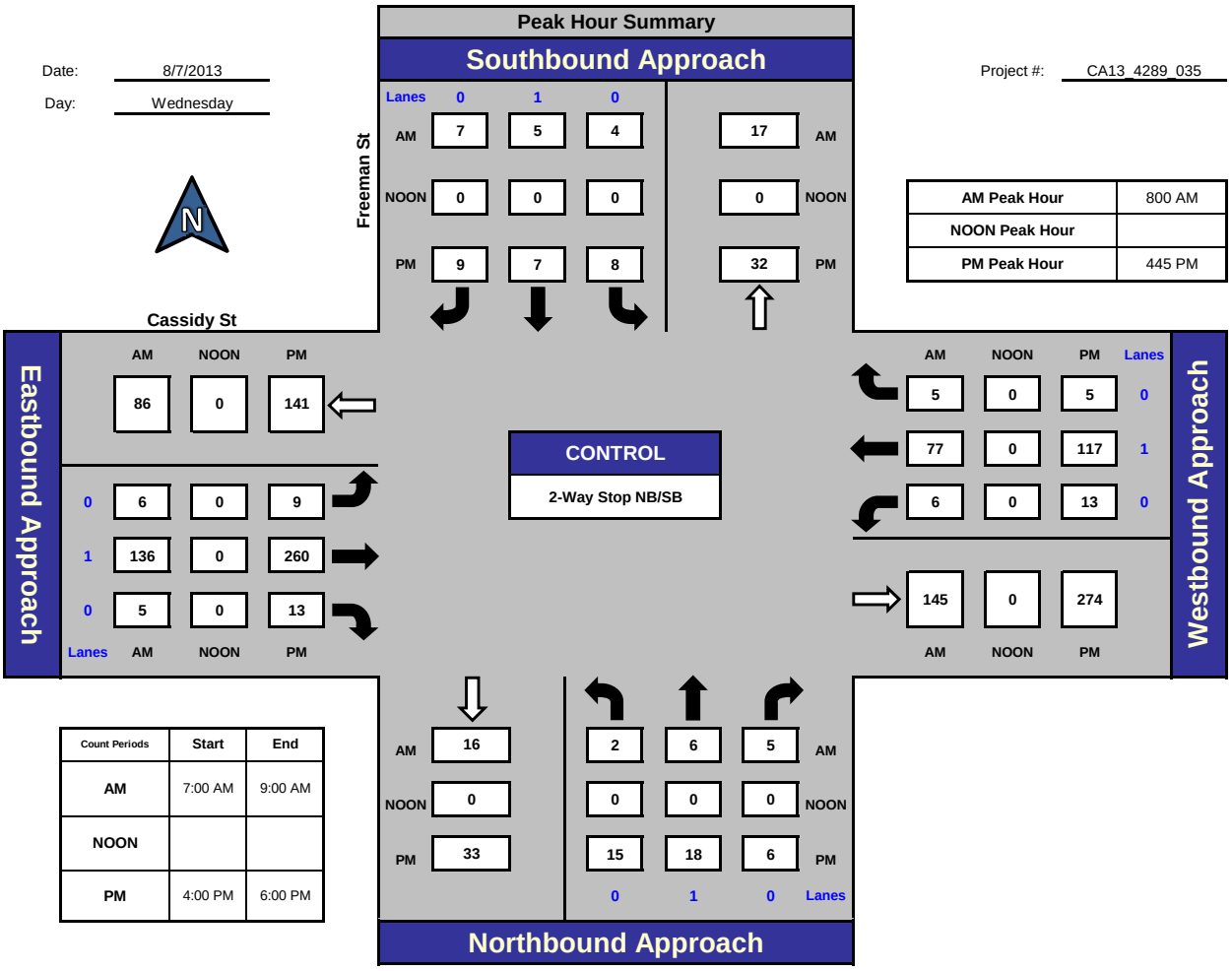
National Data & Surveying Services

Freeman St and Cassidy St , City of Oceanside

Date: 8/7/2013

Day: Wednesday

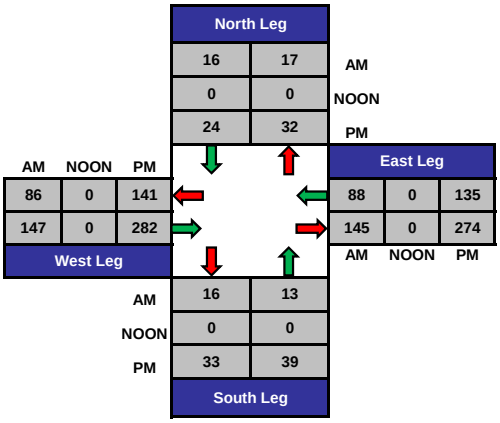
Project #: CA13_4289_035



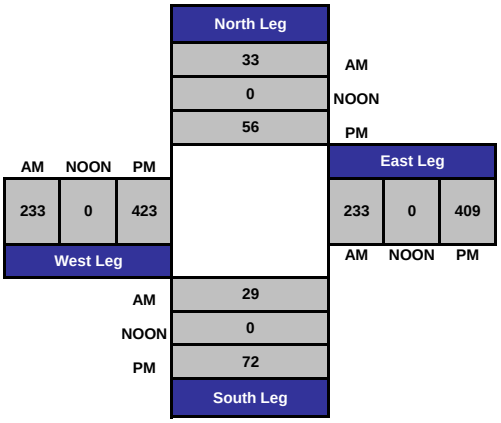
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

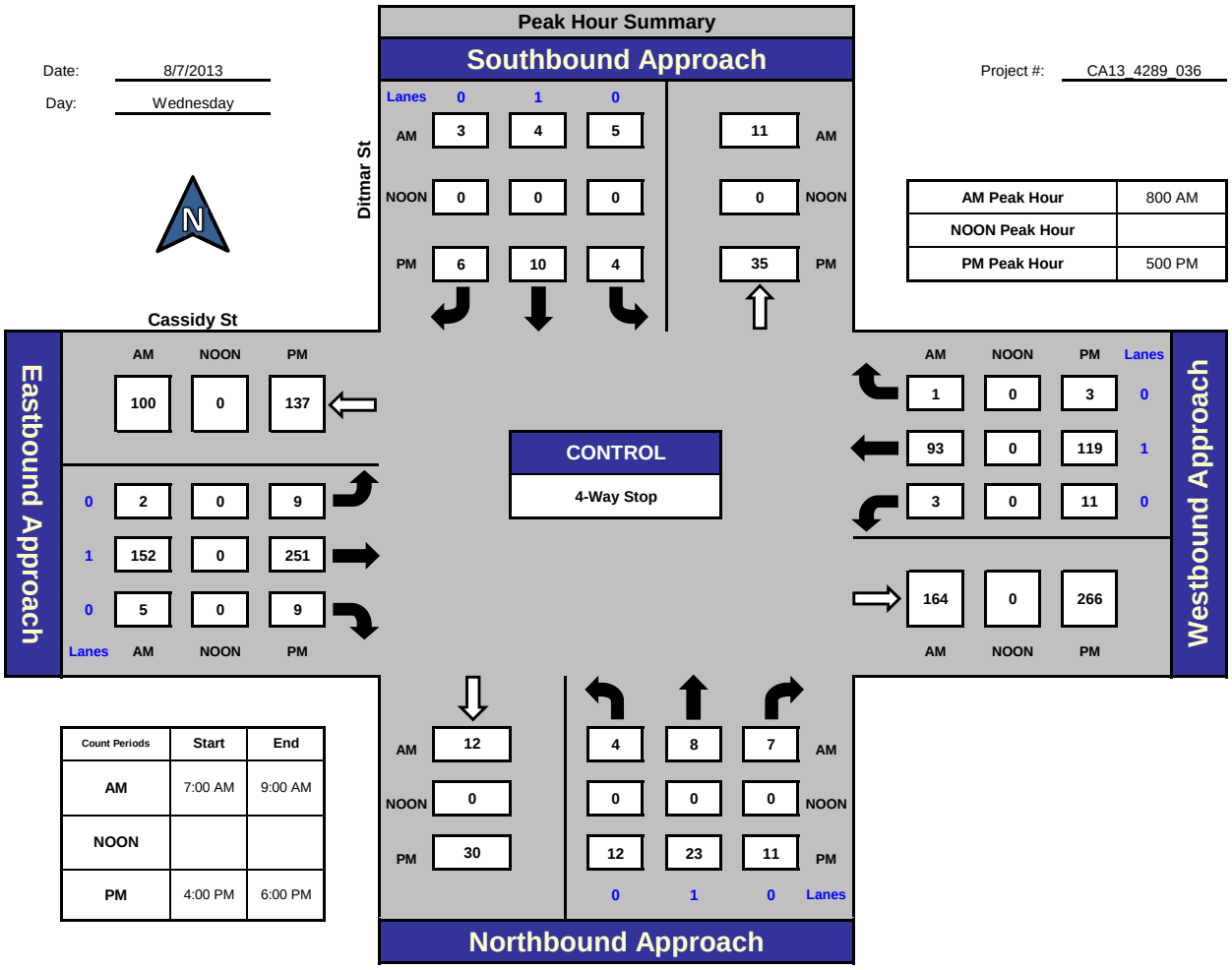
National Data & Surveying Services

Ditmar St and Cassidy St , City of Oceanside

Date: 8/7/2013

Day: Wednesday

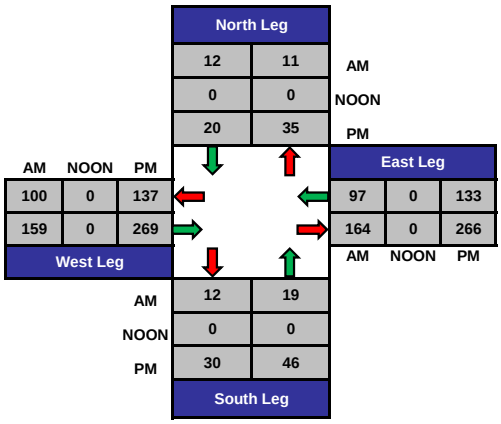
Project #: CA13_4289_036



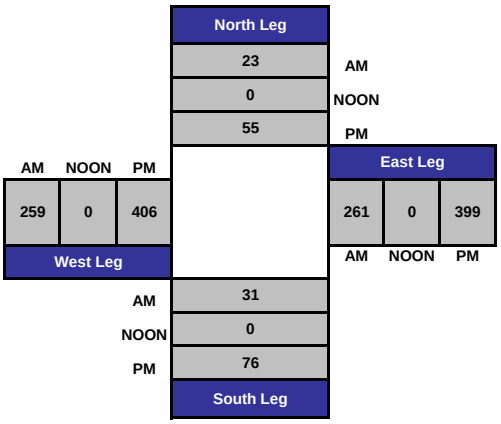
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	500 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

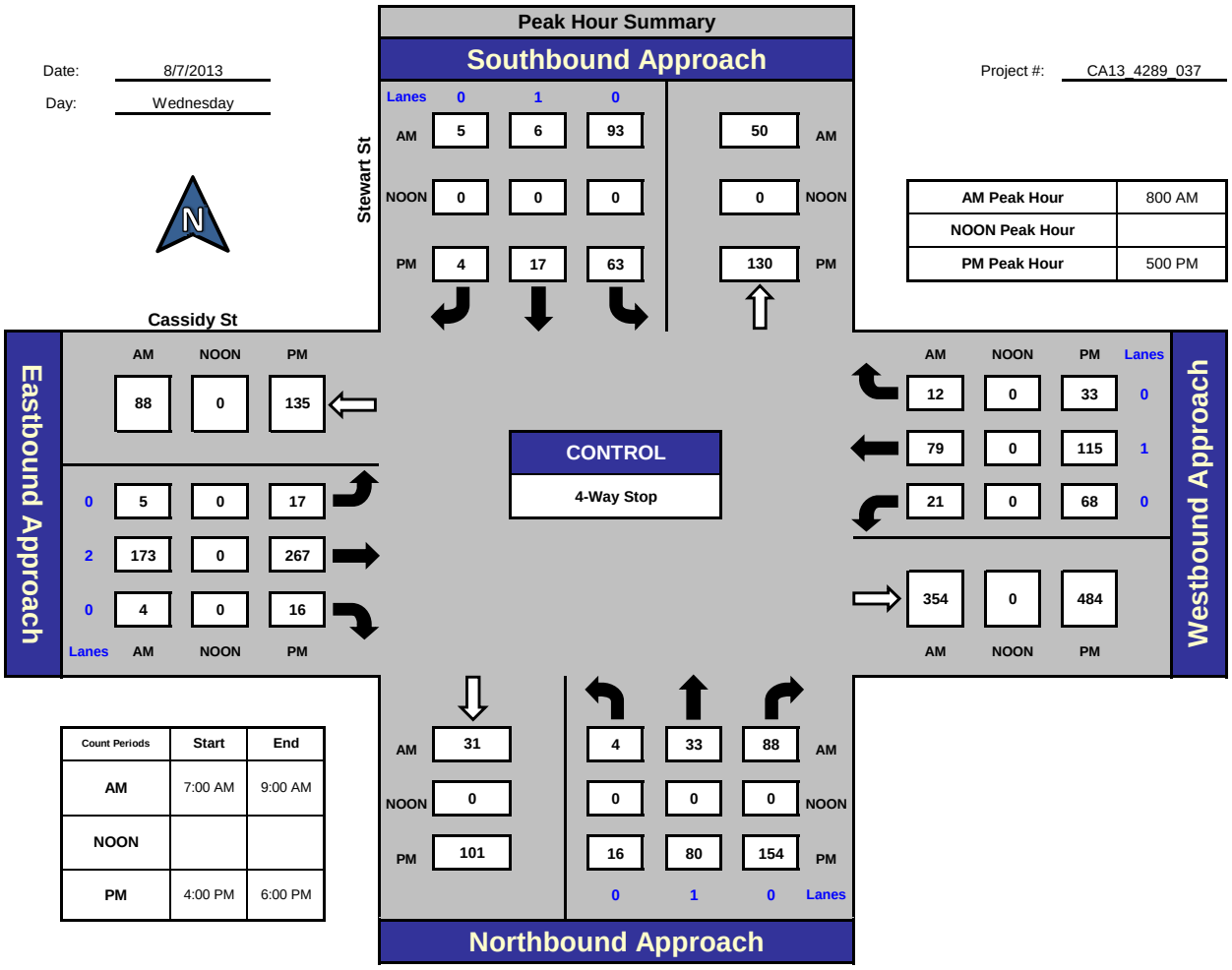
National Data & Surveying Services

Stewart St and Cassidy St , City of Oceanside

Date: 8/7/2013

Day: Wednesday

Project #: CA13_4289_037



AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	500 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs

North Leg		
104	50	AM
0	0	NOON
84	130	PM

West Leg			East Leg		
AM	NOON	PM			
88	0	135	112	0	216
182	0	300	354	0	484
			AM	NOON	PM

South Leg		
31	125	AM
0	0	NOON
101	250	PM

Total Volume Per Leg

North Leg	
154	AM
0	NOON
214	PM

West Leg			East Leg		
AM	NOON	PM			
270	0	435	466	0	700
			AM	NOON	PM

South Leg	
156	AM
0	NOON
351	PM

ITM Peak Hour Summary

Prepared by:

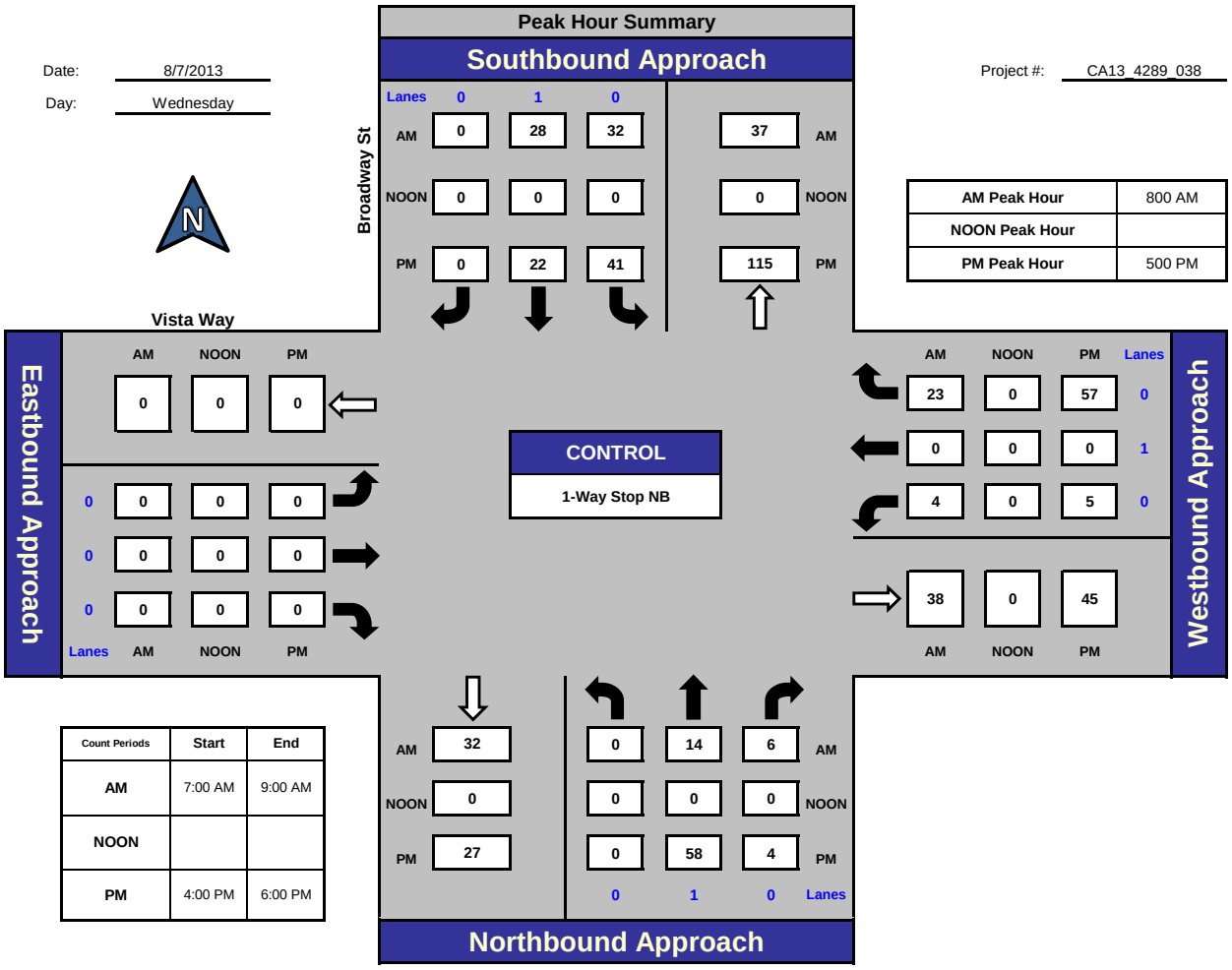
National Data & Surveying Services

Broadway St and Vista Way , City of Oceanside

Date: 8/7/2013

Day: Wednesday

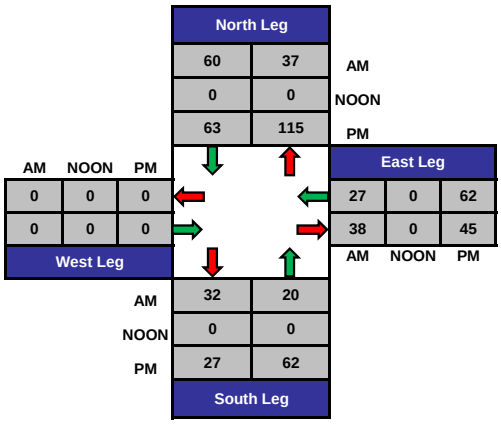
Project #: CA13_4289_038



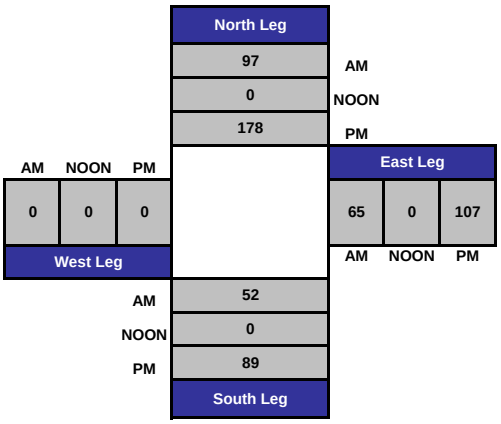
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	500 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

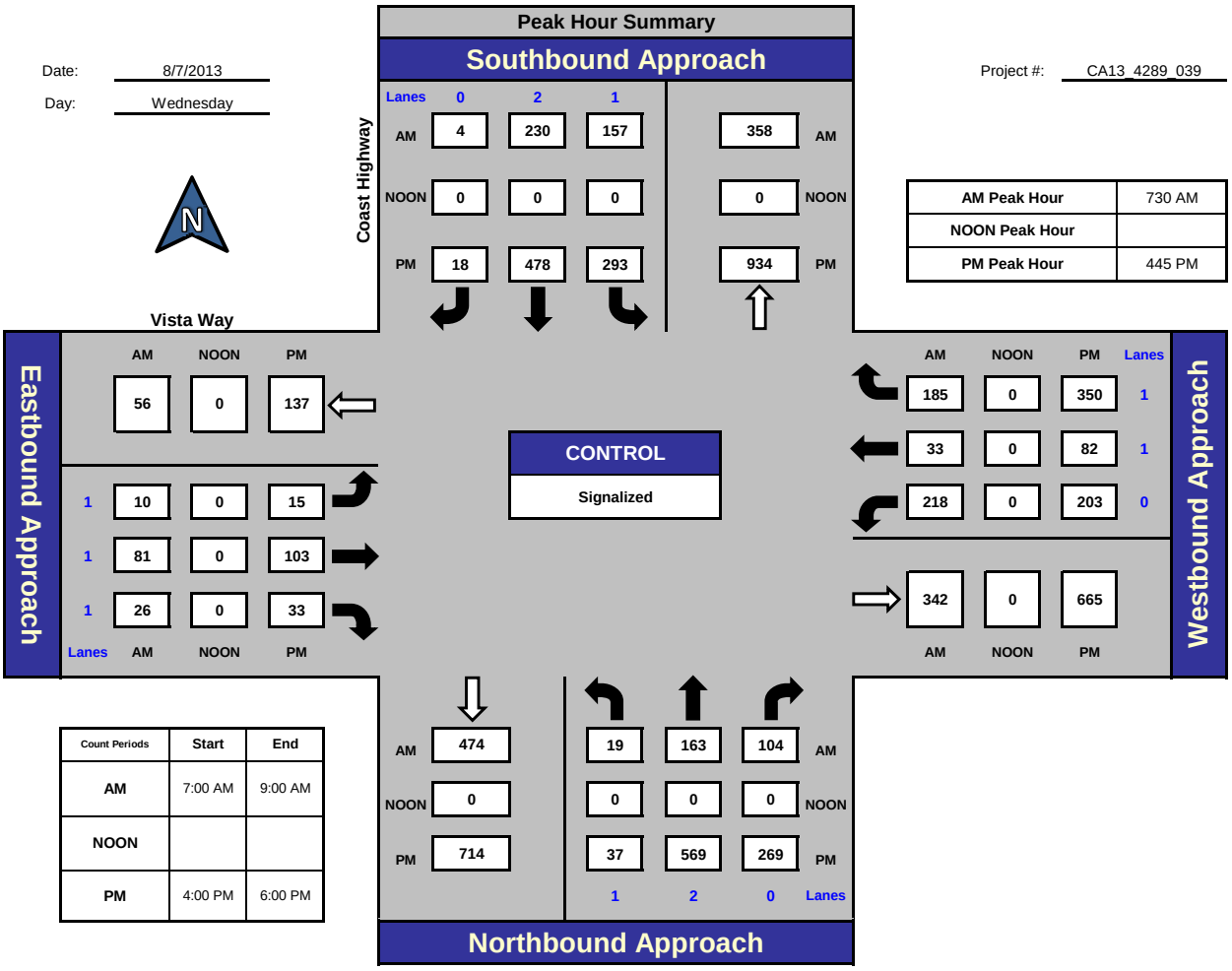
National Data & Surveying Services

Coast Highway and Vista Way , City of Oceanside

Date: 8/7/2013

Day: Wednesday

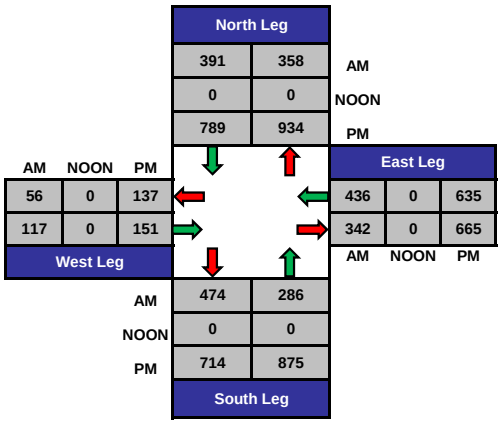
Project #: CA13_4289_039



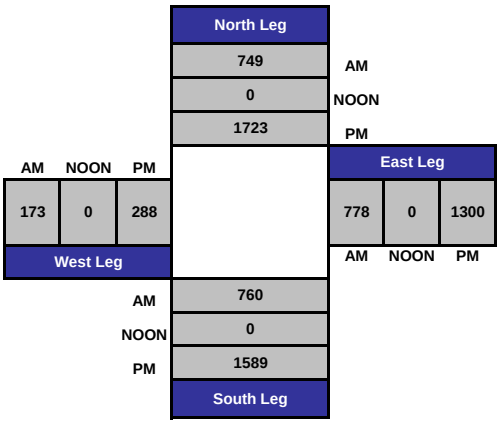
AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Freeman St and Vista Way , City of Oceanside

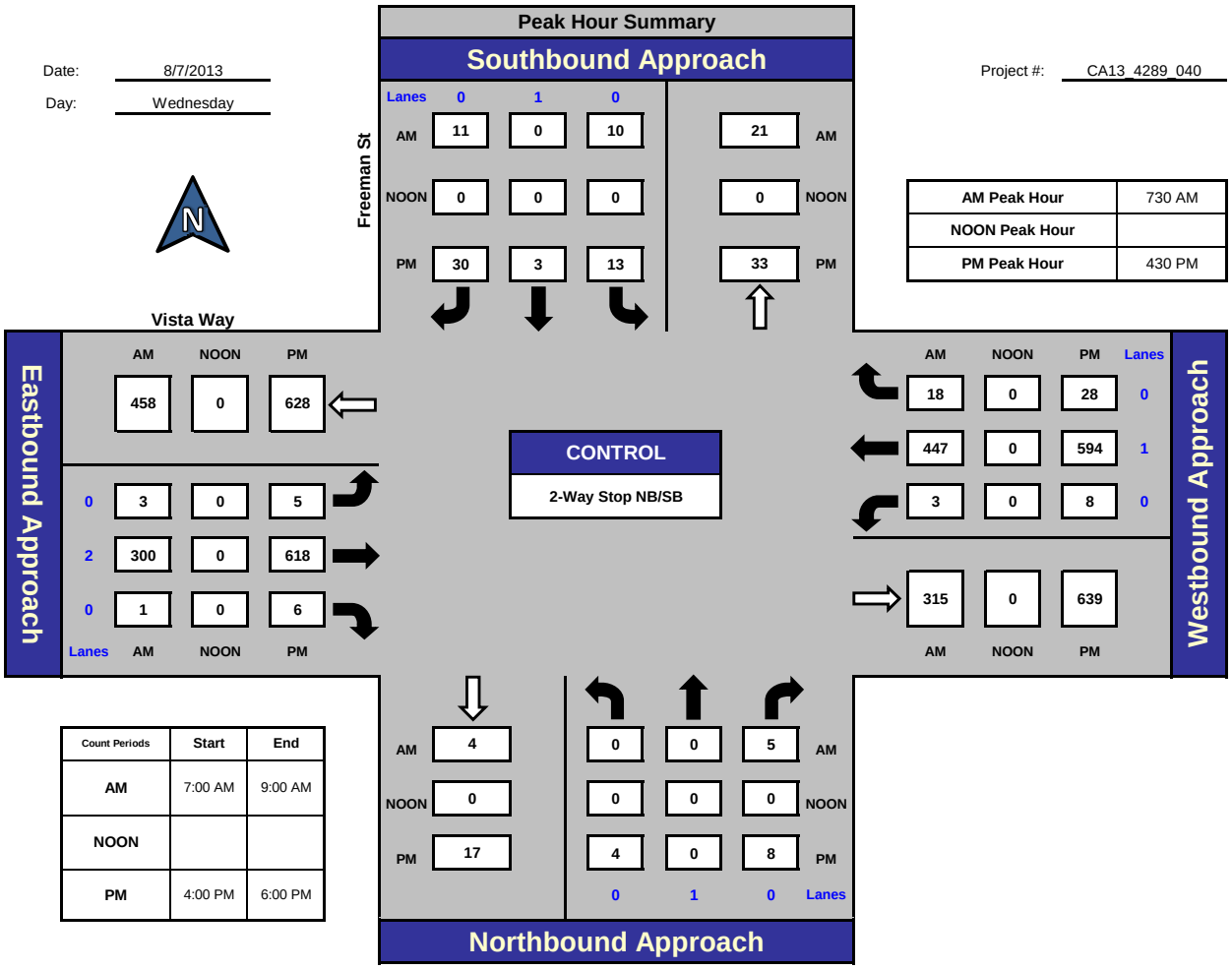
Date: 8/7/2013

Day: Wednesday

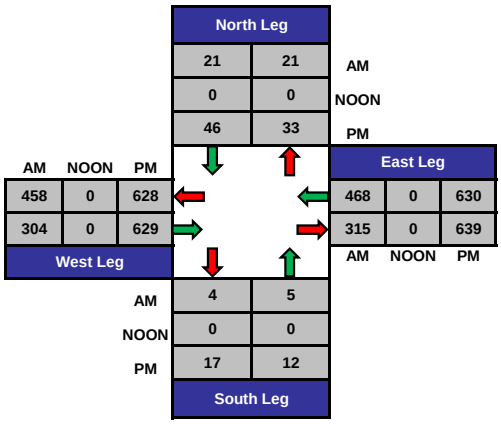
Project #: CA13_4289_040

AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	430 PM

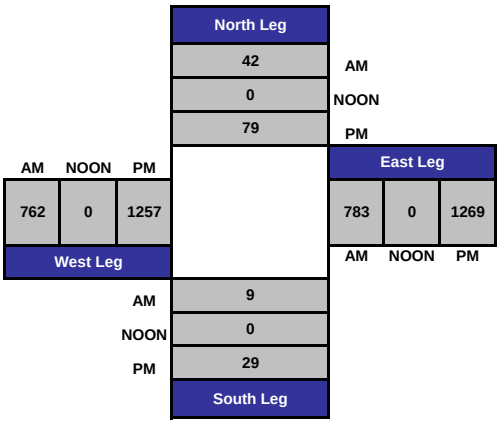
Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM



Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

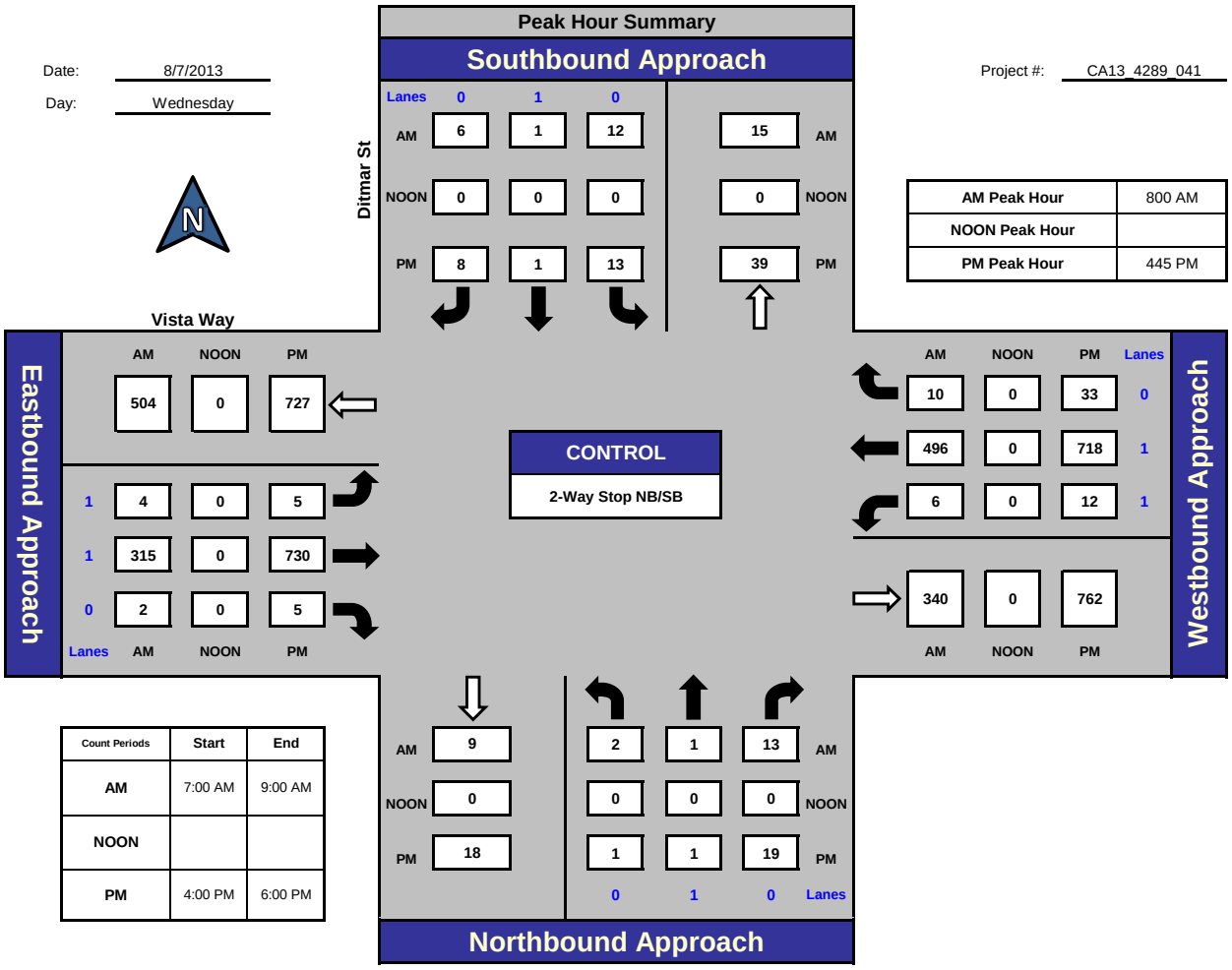
National Data & Surveying Services

Ditmar St and Vista Way , City of Oceanside

Date: 8/7/2013

Day: Wednesday

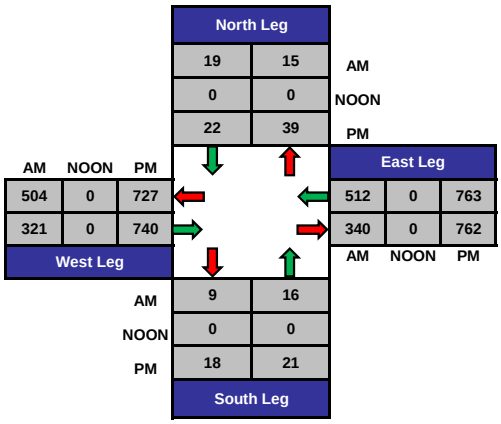
Project #: CA13_4289_041



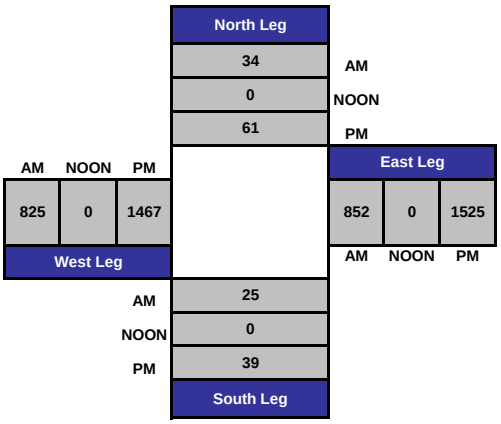
AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Stewart St and Vista Way , City of Oceanside

Date: 8/7/2013

Day: Wednesday

Project #: CA13_4289_042

AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	500 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Peak Hour Summary

Southbound Approach

Lanes	1	0	0		
AM	10	0	1	80	AM
NOON	0	0	0	0	NOON
PM	11	0	3	213	PM

Stewart St

Vista Way

Eastbound Approach

	AM	NOON	PM	
	508	0	754	
1	14	0	8	
1	386	0	722	
0	1	0	0	
Lanes	AM	NOON	PM	

Westbound Approach

	AM	NOON	PM	Lanes
	66	0	205	0
	498	0	743	1
	6	0	9	1
	392	0	730	
	AM	NOON	PM	

CONTROL

2-Way Stop NB/SB

Northbound Approach

AM	7	0	0	5	AM
NOON	0	0	0	0	NOON
PM	9	0	0	5	PM
		0	1	0	Lanes

Total Ins & Outs

North Leg		
11	80	AM
0	0	NOON
14	213	PM

West Leg			AM	NOON	PM
508	0	754			
401	0	730			

East Leg			AM	NOON	PM
570	0	957			
392	0	730			

South Leg		
7	5	AM
0	0	NOON
9	5	PM

Total Volume Per Leg

North Leg		
91		AM
0		NOON
227		PM

West Leg			AM	NOON	PM
909	0	1484			

East Leg			AM	NOON	PM
962	0	1687			

South Leg		
12		AM
0		NOON
14		PM

ITM Peak Hour Summary

Prepared by:

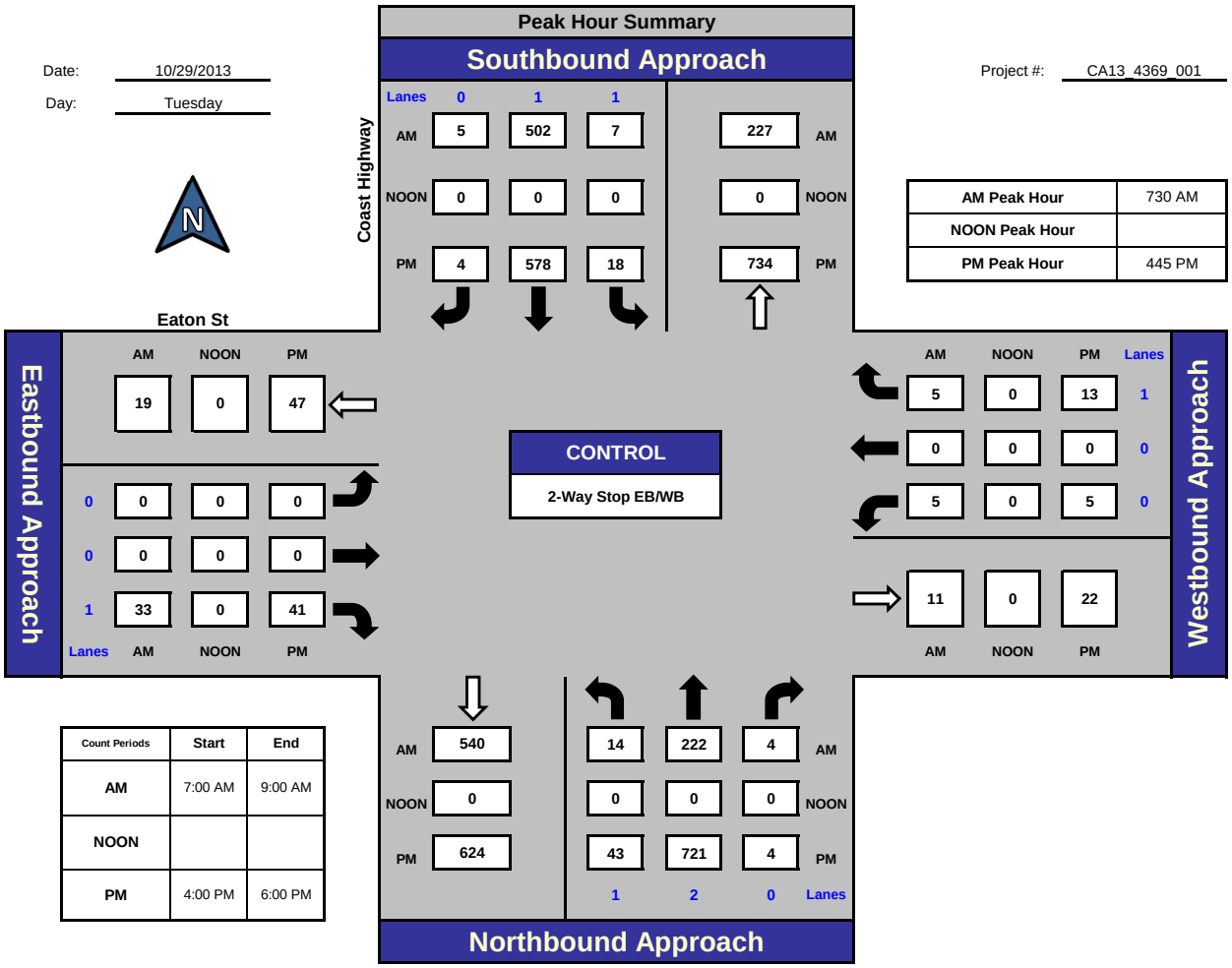
National Data & Surveying Services

Coast Highway and Eaton St , City of Oceanside

Date: 10/29/2013

Day: Tuesday

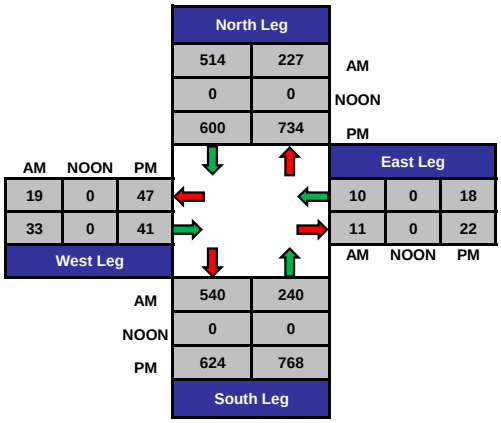
Project #: CA13_4369_001



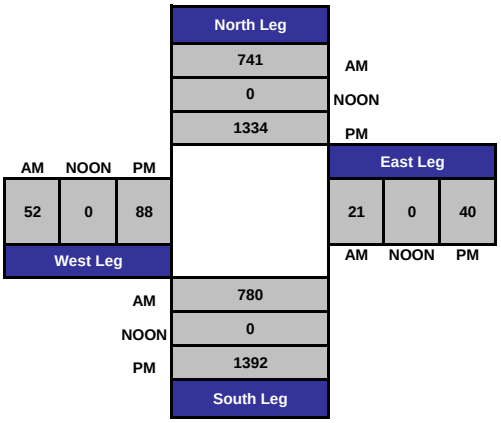
AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	445 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON		
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



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Corona, CA 92878
(951) 268-6268

County of San Diego
N/S: Vandegrift Boulevard/Harbor Drive
E/W: I-5 NB On Ramp/San Rafael Drive
Weather: Clear

File Name : 01_CSD_Vandegrift_Harbor_5N On_San Rafael AM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	Vandegrift Boulevard Southbound				San Rafael Drive Westbound				Harbor Drive Northbound				I-5 Northbound On Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	9	137	55	201	43	2	13	58	8	471	4	483	0	0	0	0	742
07:15 AM	7	143	45	195	44	4	10	58	13	442	1	456	0	0	0	0	709
07:30 AM	1	144	19	164	33	5	10	48	22	412	1	435	0	0	0	0	647
07:45 AM	7	168	22	197	39	3	2	44	10	325	2	337	0	0	0	0	578
Total	24	592	141	757	159	14	35	208	53	1650	8	1711	0	0	0	0	2676
08:00 AM	6	149	19	174	40	7	1	48	12	231	2	245	0	0	0	0	467
08:15 AM	6	130	24	160	50	3	2	55	21	209	3	233	0	0	0	0	448
08:30 AM	0	153	12	165	40	5	3	48	16	176	1	193	0	0	0	0	406
08:45 AM	6	120	21	147	37	6	1	44	12	173	2	187	0	0	0	0	378
Total	18	552	76	646	167	21	7	195	61	789	8	858	0	0	0	0	1699
Grand Total	42	1144	217	1403	326	35	42	403	114	2439	16	2569	0	0	0	0	4375
Apprch %	3	81.5	15.5		80.9	8.7	10.4		4.4	94.9	0.6		0	0	0		
Total %	1	26.1	5	32.1	7.5	0.8	1	9.2	2.6	55.7	0.4	58.7	0	0	0	0	

	Vandegrift Boulevard Southbound				San Rafael Drive Westbound				Harbor Drive Northbound				I-5 Northbound On Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	**9**	137	**55**	**201**	43	2	**13**	**58**	8	**471**	**4**	**483**	0	0	0	0	**742**
07:15 AM	7	143	45	195	**44**	4	10	58	13	442	1	456	0	0	0	0	709
07:30 AM	1	144	19	164	33	**5**	10	48	**22**	412	1	435	0	0	0	0	647
07:45 AM	7	**168**	22	197	39	3	2	44	10	325	2	337	0	0	0	0	578
Total Volume	24	592	141	757	159	14	35	208	53	1650	8	1711	0	0	0	0	2676
% App. Total	3.2	78.2	18.6		76.4	6.7	16.8		3.1	96.4	0.5		0	0	0		
PHF	.667	.881	.641	.942	.903	.700	.673	.897	.602	.876	.500	.886	.000	.000	.000	.000	.902

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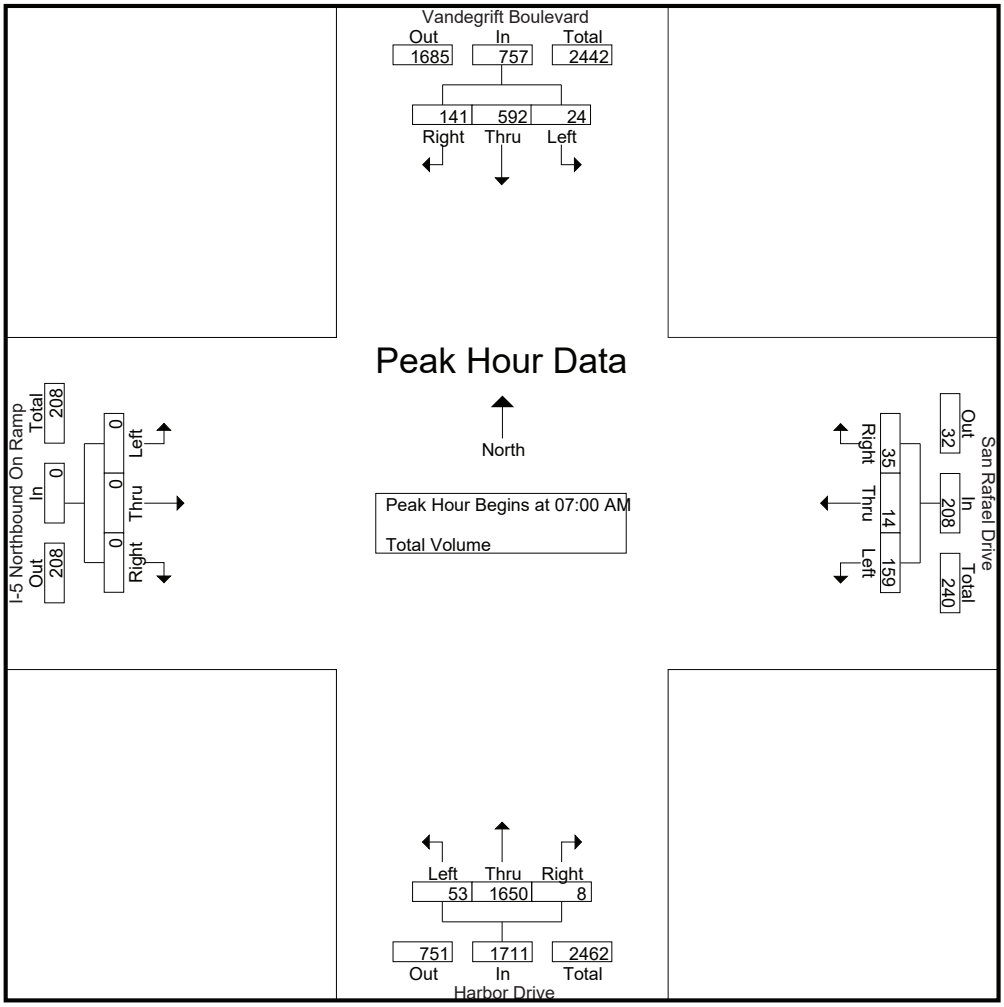
County of San Diego
N/S: Vandegrift Boulevard/Harbor Drive
E/W: I-5 NB On Ramp/San Rafael Drive
Weather: Clear

File Name : 01_CSD_Vandegrift_Harbor_5N On_San Rafael AM
Site Code :
Start Date : 3/13/2018



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				07:00 AM				07:00 AM			
+0 mins.	**9**	137	**55**	**201**	43	2	**13**	**58**	8	**471**	**4**	**483**	0	0	0	0
+15 mins.	7	143	45	195	**44**	4	10	58	13	442	1	456	0	0	0	0
+30 mins.	1	144	19	164	33	**5**	10	48	**22**	412	1	435	0	0	0	0
+45 mins.	7	**168**	22	197	39	3	2	44	10	325	2	337	0	0	0	0
Total Volume	24	592	141	757	159	14	35	208	53	1650	8	1711	0	0	0	0
% App. Total	3.2	78.2	18.6		76.4	6.7	16.8		3.1	96.4	0.5		0	0	0	
PHF	.667	.881	.641	.942	.903	.700	.673	.897	.602	.876	.500	.886	.000	.000	.000	.000

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County of San Diego
N/S: Vandegrift Boulevard/Harbor Drive
E/W: I-5 NB On Ramp/San Rafael Drive
Weather: Clear

File Name : 01_CSD_Vandegrift_Harbor_5N On_San Rafael PM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	Vandegrift Boulevard Southbound				San Rafael Drive Westbound				Harbor Drive Northbound				I-5 Northbound On Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	6	419	49	474	37	2	1	40	28	191	7	226	0	0	0	0	740
04:15 PM	6	429	30	465	29	0	4	33	28	201	2	231	0	0	0	0	729
04:30 PM	8	455	38	501	27	1	5	33	30	210	4	244	0	0	0	0	778
04:45 PM	7	447	39	493	24	0	5	29	23	210	4	237	0	0	0	0	759
Total	27	1750	156	1933	117	3	15	135	109	812	17	938	0	0	0	0	3006
05:00 PM	5	447	22	474	29	0	1	30	17	230	4	251	0	0	0	0	755
05:15 PM	1	370	29	400	31	0	1	32	20	232	6	258	0	0	0	0	690
05:30 PM	4	407	20	431	29	3	6	38	22	227	8	257	0	0	0	0	726
05:45 PM	8	310	19	337	19	1	0	20	25	186	3	214	0	0	0	0	571
Total	18	1534	90	1642	108	4	8	120	84	875	21	980	0	0	0	0	2742
Grand Total	45	3284	246	3575	225	7	23	255	193	1687	38	1918	0	0	0	0	5748
Apprch %	1.3	91.9	6.9		88.2	2.7	9		10.1	88	2		0	0	0		
Total %	0.8	57.1	4.3	62.2	3.9	0.1	0.4	4.4	3.4	29.3	0.7	33.4	0	0	0	0	

	Vandegrift Boulevard Southbound				San Rafael Drive Westbound				Harbor Drive Northbound				I-5 Northbound On Ramp Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	6	429	30	465	**29**	0	4	**33**	28	201	2	231	0	0	0	0	729
04:30 PM	**8**	**455**	38	**501**	27	**1**	**5**	33	**30**	210	**4**	244	0	0	0	0	**778**
04:45 PM	7	447	**39**	493	24	0	5	29	23	210	4	237	0	0	0	0	759
05:00 PM	5	447	22	474	29	0	1	30	17	**230**	4	**251**	0	0	0	0	755
Total Volume	26	1778	129	1933	109	1	15	125	98	851	14	963	0	0	0	0	3021
% App. Total	1.3	92	6.7		87.2	0.8	12		10.2	88.4	1.5		0	0	0		
PHF	.813	.977	.827	.965	.940	.250	.750	.947	.817	.925	.875	.959	.000	.000	.000	.000	.971

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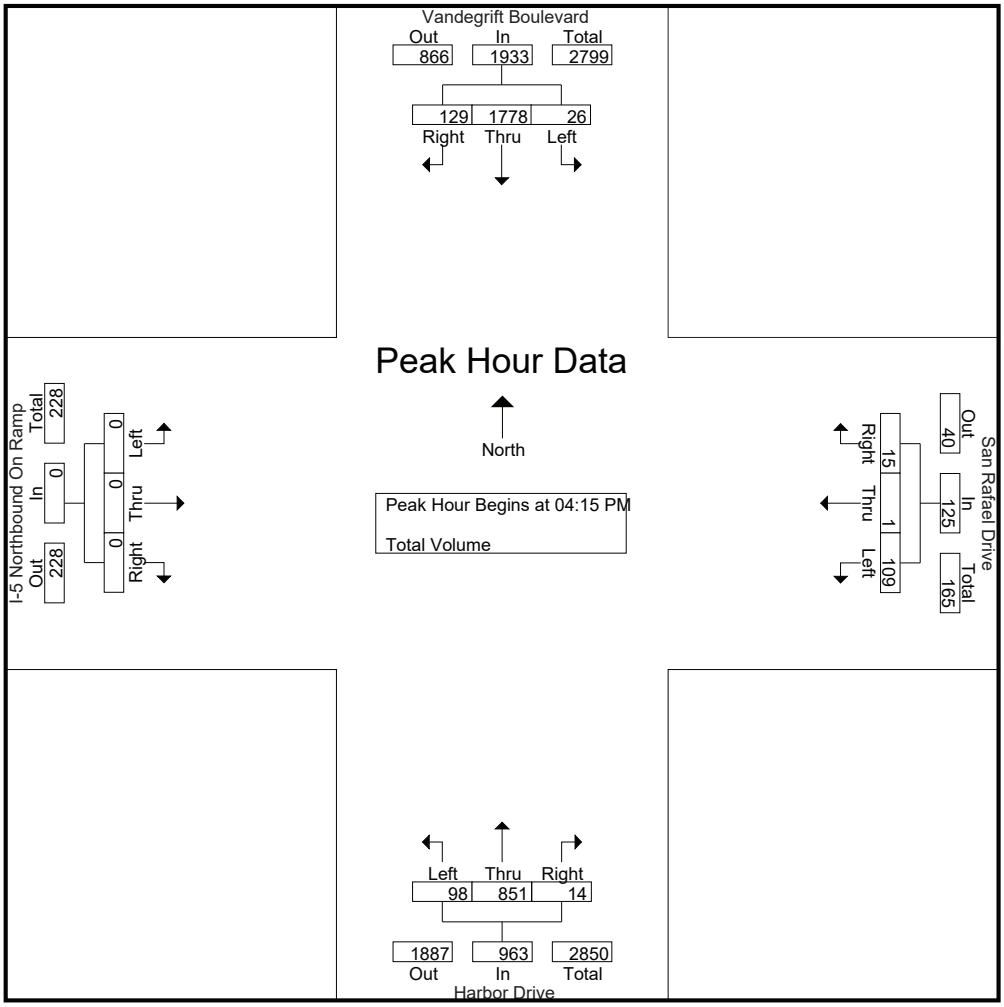
County of San Diego
N/S: Vandegrift Boulevard/Harbor Drive
E/W: I-5 NB On Ramp/San Rafael Drive
Weather: Clear

File Name : 01_CSD_Vandegrift_Harbor_5N On_San Rafael PM
Site Code :
Start Date : 3/13/2018
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:45 PM				04:00 PM			
+0 mins.	6	419	**49**	474	**37**	**2**	1	**40**	**23**	210	4	237	0	0	0	0
+15 mins.	6	429	30	465	29	0	4	33	17	230	4	251	0	0	0	0
+30 mins.	**8**	**455**	38	**501**	27	1	**5**	33	20	**232**	6	**258**	0	0	0	0
+45 mins.	7	447	39	493	24	0	5	29	22	227	**8**	257	0	0	0	0
Total Volume	27	1750	156	1933	117	3	15	135	82	899	22	1003	0	0	0	0
% App. Total	1.4	90.5	8.1		86.7	2.2	11.1		8.2	89.6	2.2		0	0	0	
PHF	.844	.962	.796	.965	.791	.375	.750	.844	.891	.969	.688	.972	.000	.000	.000	.000

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City of Oceanside
N/S: I-5 Southbound Ramps
E/W: SR-76
Weather: Clear

File Name : 02_OCS_5S_CA-76 AM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	SR-76 Westbound			I-5 Southbound Ramps Northbound			SR-76 Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	207	141	348	0	0	0	54	34	88	436
07:15 AM	240	161	401	0	0	0	55	35	90	491
07:30 AM	264	147	411	0	0	0	68	45	113	524
07:45 AM	231	153	384	0	0	0	80	47	127	511
Total	942	602	1544	0	0	0	257	161	418	1962
08:00 AM	213	100	313	0	0	0	72	61	133	446
08:15 AM	234	108	342	0	0	0	44	56	100	442
08:30 AM	254	104	358	0	0	0	69	47	116	474
08:45 AM	227	125	352	0	0	0	57	51	108	460
Total	928	437	1365	0	0	0	242	215	457	1822
Grand Total	1870	1039	2909	0	0	0	499	376	875	3784
Apprch %	64.3	35.7		0	0		57	43		
Total %	49.4	27.5	76.9	0	0	0	13.2	9.9	23.1	

	SR-76 Westbound			I-5 Southbound Ramps Northbound			SR-76 Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:15 AM										
07:15 AM	240	**161**	401	0	0	0	55	35	90	491
07:30 AM	**264**	147	**411**	0	0	0	68	45	113	**524**
07:45 AM	231	153	384	0	0	0	**80**	47	127	511
08:00 AM	213	100	313	0	0	0	72	**61**	**133**	446
Total Volume	948	561	1509	0	0	0	275	188	463	1972
% App. Total	62.8	37.2		0	0		59.4	40.6		
PHF	.898	.871	.918	.000	.000	.000	.859	.770	.870	.941

Counts Unlimited
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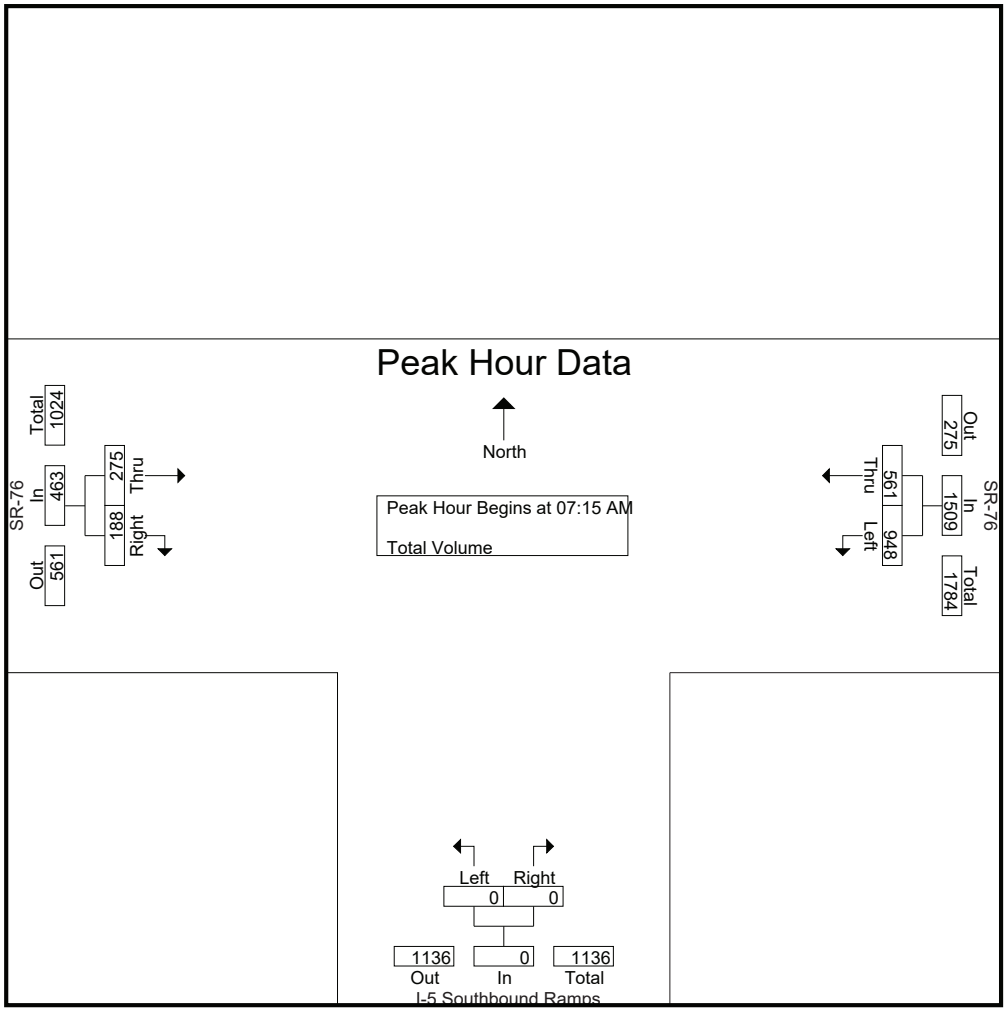
City of Oceanside
N/S: I-5 Southbound Ramps
E/W: SR-76
Weather: Clear

File Name : 02_OCS_5S_CA-76 AM
Site Code :
Start Date : 3/13/2018
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM			07:00 AM			07:45 AM		
+0 mins.	207	141	348	0	0	0	**80**	47	127
+15 mins.	240	**161**	401	0	0	0	72	**61**	**133**
+30 mins.	**264**	147	**411**	0	0	0	44	56	100
+45 mins.	231	153	384	0	0	0	69	47	116
Total Volume	942	602	1544	0	0	0	265	211	476
% App. Total	61	39		0	0		55.7	44.3	
PHF	.892	.935	.939	.000	.000	.000	.828	.865	.895

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City of Oceanside
N/S: I-5 Southbound Ramps
E/W: SR-76
Weather: Clear

File Name : 02_OCS_5S_CA-76 PM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	SR-76 Westbound			I-5 Southbound Ramps Northbound			SR-76 Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	134	167	301	0	0	0	162	61	223	524
04:15 PM	152	173	325	0	0	0	116	43	159	484
04:30 PM	149	148	297	0	0	0	148	52	200	497
04:45 PM	162	168	330	0	0	0	127	44	171	501
Total	597	656	1253	0	0	0	553	200	753	2006
05:00 PM	164	178	342	0	0	0	191	70	261	603
05:15 PM	140	162	302	0	0	0	102	48	150	452
05:30 PM	156	160	316	0	0	0	110	55	165	481
05:45 PM	130	140	270	0	0	0	111	60	171	441
Total	590	640	1230	0	0	0	514	233	747	1977
Grand Total	1187	1296	2483	0	0	0	1067	433	1500	3983
Apprch %	47.8	52.2		0	0		71.1	28.9		
Total %	29.8	32.5	62.3	0	0	0	26.8	10.9	37.7	

	SR-76 Westbound			I-5 Southbound Ramps Northbound			SR-76 Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:15 PM										
04:15 PM	152	173	325	0	0	0	116	43	159	484
04:30 PM	149	148	297	0	0	0	148	52	200	497
04:45 PM	162	168	330	0	0	0	127	44	171	501
05:00 PM	**164**	**178**	**342**	0	0	0	**191**	**70**	**261**	**603**
Total Volume	627	667	1294	0	0	0	582	209	791	2085
% App. Total	48.5	51.5		0	0		73.6	26.4		
PHF	.956	.937	.946	.000	.000	.000	.762	.746	.758	.864

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City of Oceanside
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File Name : 02_OCS_5S_CA-76 PM
Site Code :
Start Date : 3/13/2018
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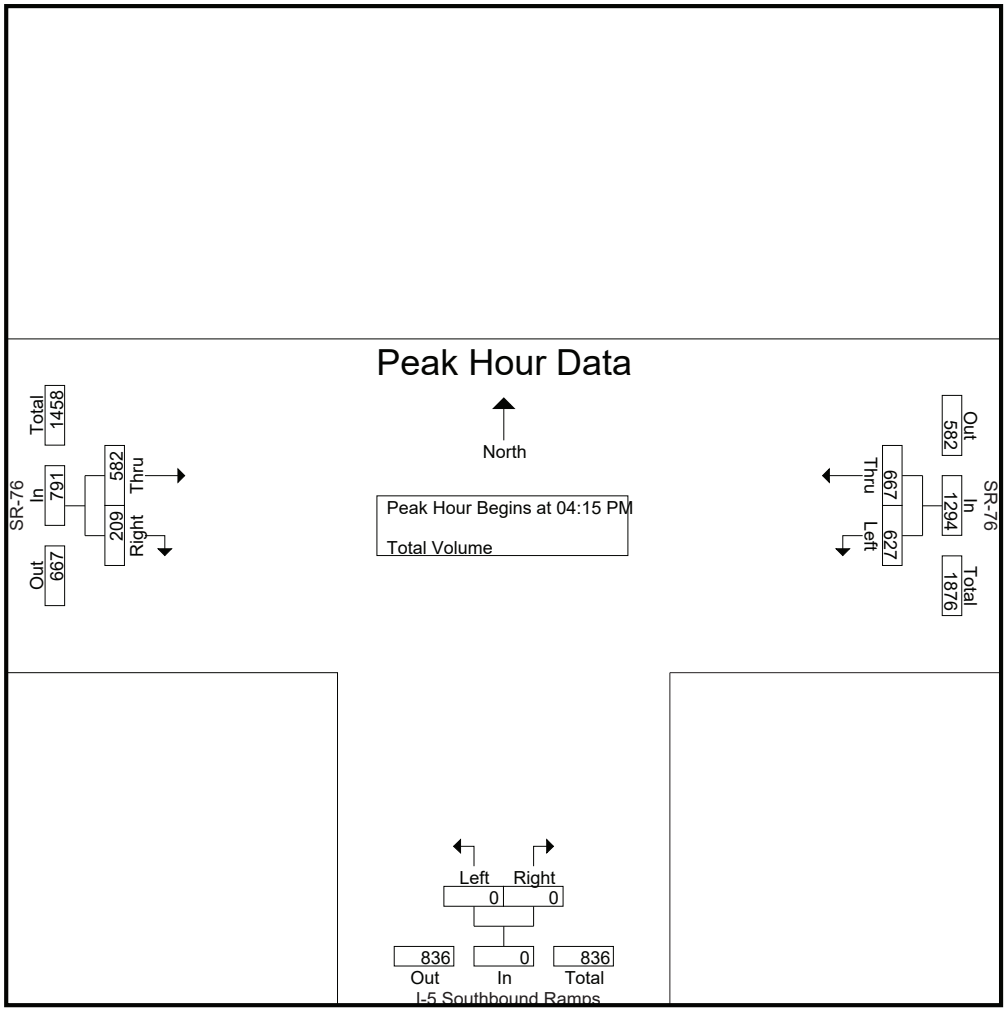

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:15 PM			04:00 PM			04:15 PM		
+0 mins.	152	173	325	0	0	0	116	43	159
+15 mins.	149	148	297	0	0	0	148	52	200
+30 mins.	162	168	330	0	0	0	127	44	171
+45 mins.	**164**	**178**	**342**	0	0	0	**191**	**70**	**261**
Total Volume	627	667	1294	0	0	0	582	209	791
% App. Total	48.5	51.5		0	0		73.6	26.4	
PHF	.956	.937	.946	.000	.000	.000	.762	.746	.758

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City of Oceanside
N/S: I-5 Northbound Ramps
E/W: SR-76
Weather: Clear

File Name : 03_OCS_5N_CA-76 AM
Site Code :
Start Date : 3/13/2018
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Groups Printed- Total Volume

	SR-76 Westbound			I-5 Northbound Ramps Northbound			SR-76 Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	250	314	564	15	0	15	112	20	132	711
07:15 AM	250	358	608	25	1	26	111	16	127	761
07:30 AM	255	390	645	16	0	16	116	23	139	800
07:45 AM	225	372	597	23	0	23	127	20	147	767
Total	980	1434	2414	79	1	80	466	79	545	3039
08:00 AM	180	293	473	21	0	21	145	15	160	654
08:15 AM	177	338	515	16	0	16	147	17	164	695
08:30 AM	172	325	497	22	0	22	131	22	153	672
08:45 AM	163	317	480	38	0	38	131	14	145	663
Total	692	1273	1965	97	0	97	554	68	622	2684
Grand Total	1672	2707	4379	176	1	177	1020	147	1167	5723
Apprch %	38.2	61.8		99.4	0.6		87.4	12.6		
Total %	29.2	47.3	76.5	3.1	0	3.1	17.8	2.6	20.4	

	SR-76 Westbound			I-5 Northbound Ramps Northbound			SR-76 Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:00 AM										
07:00 AM	250	314	564	15	0	15	112	20	132	711
07:15 AM	250	358	608	**25**	**1**	**26**	111	16	127	761
07:30 AM	**255**	**390**	**645**	16	0	16	116	**23**	139	**800**
07:45 AM	225	372	597	23	0	23	**127**	20	**147**	767
Total Volume	980	1434	2414	79	1	80	466	79	545	3039
% App. Total	40.6	59.4		98.8	1.2		85.5	14.5		
PHF	.961	.919	.936	.790	.250	.769	.917	.859	.927	.950

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City of Oceanside
N/S: I-5 Northbound Ramps
E/W: SR-76
Weather: Clear

File Name : 03_OCS_5N_CA-76 AM
Site Code :
Start Date : 3/13/2018
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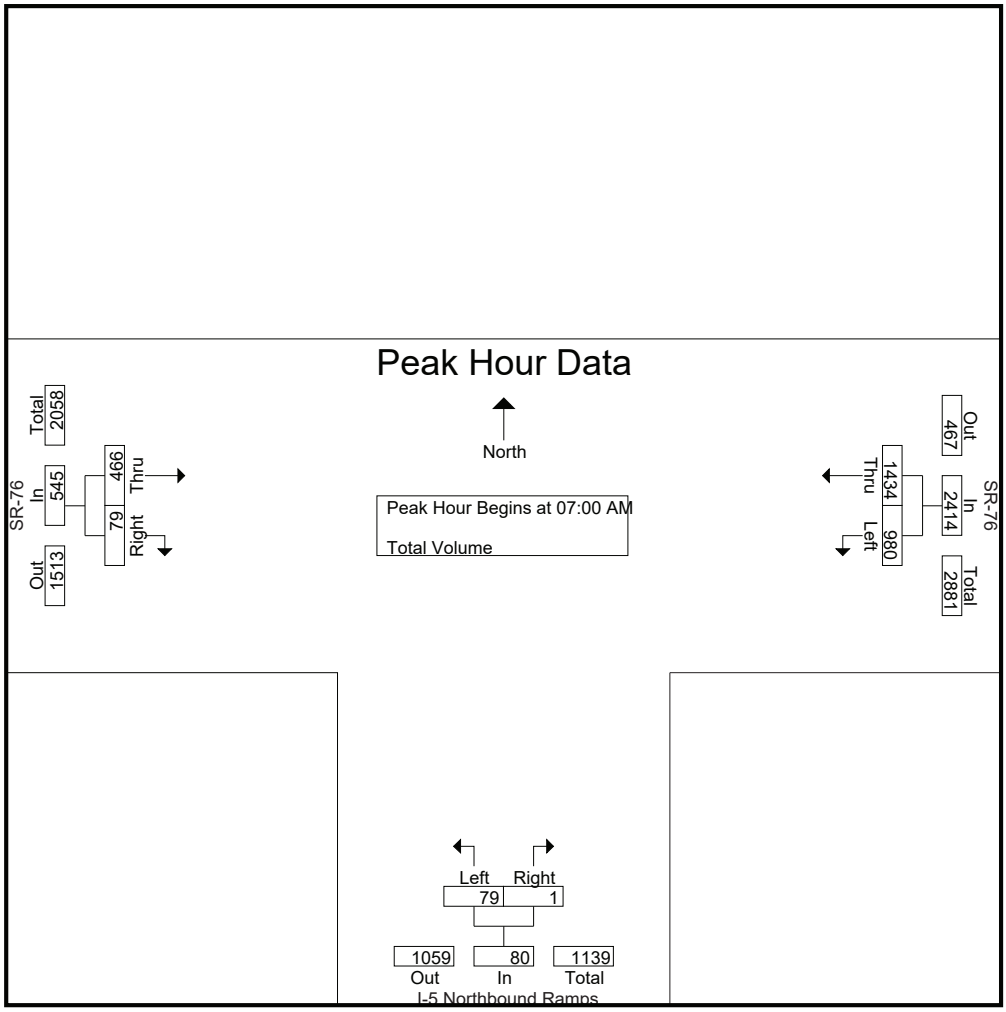

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM			08:00 AM			07:45 AM		
+0 mins.	250	314	564	21	0	21	127	20	147
+15 mins.	250	358	608	16	0	16	145	15	160
+30 mins.	**255**	**390**	**645**	22	0	22	**147**	17	**164**
+45 mins.	225	372	597	**38**	0	**38**	131	**22**	153
Total Volume	980	1434	2414	97	0	97	550	74	624
% App. Total	40.6	59.4		100	0		88.1	11.9	
PHF	.961	.919	.936	.638	.000	.638	.935	.841	.951

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City of Oceanside
N/S: I-5 Northbound Ramps
E/W: SR-76
Weather: Clear

File Name : 03_OCS_5N_CA-76 PM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	SR-76 Westbound			I-5 Northbound Ramps Northbound			SR-76 Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	90	196	286	65	0	65	346	27	373	724
04:15 PM	102	250	352	36	0	36	322	19	341	729
04:30 PM	88	246	334	46	0	46	315	37	352	732
04:45 PM	86	226	312	50	0	50	328	20	348	710
Total	366	918	1284	197	0	197	1311	103	1414	2895
05:00 PM	94	242	336	51	0	51	302	38	340	727
05:15 PM	81	242	323	52	0	52	268	34	302	677
05:30 PM	70	234	304	55	0	55	258	28	286	645
05:45 PM	82	231	313	45	0	45	308	33	341	699
Total	327	949	1276	203	0	203	1136	133	1269	2748
Grand Total	693	1867	2560	400	0	400	2447	236	2683	5643
Apprch %	27.1	72.9		100	0		91.2	8.8		
Total %	12.3	33.1	45.4	7.1	0	7.1	43.4	4.2	47.5	

	SR-76 Westbound			I-5 Northbound Ramps Northbound			SR-76 Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:15 PM										
04:15 PM	**102**	**250**	**352**	36	0	36	322	19	341	729
04:30 PM	88	246	334	46	0	46	315	37	**352**	**732**
04:45 PM	86	226	312	50	0	50	**328**	20	348	710
05:00 PM	94	242	336	**51**	0	**51**	302	**38**	340	727
Total Volume	370	964	1334	183	0	183	1267	114	1381	2898
% App. Total	27.7	72.3		100	0		91.7	8.3		
PHF	.907	.964	.947	.897	.000	.897	.966	.750	.981	.990

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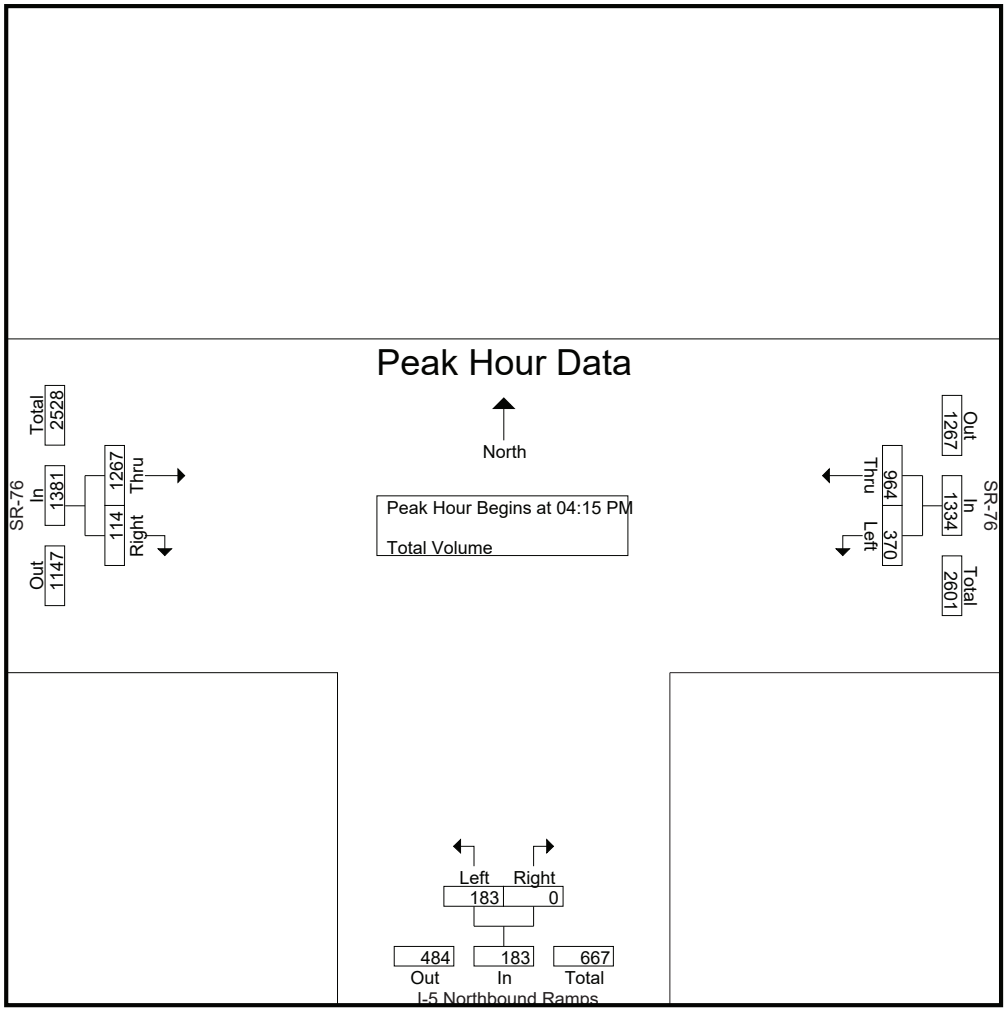
City of Oceanside
N/S: I-5 Northbound Ramps
E/W: SR-76
Weather: Clear

File Name : 03_OCS_5N_CA-76 PM
Site Code :
Start Date : 3/13/2018



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:15 PM			04:45 PM			04:00 PM		
+0 mins.	**102**	**250**	**352**	50	0	50	**346**	27	**373**
+15 mins.	88	246	334	51	0	51	322	19	341
+30 mins.	86	226	312	52	0	52	315	**37**	352
+45 mins.	94	242	336	**55**	0	**55**	328	20	348
Total Volume	370	964	1334	208	0	208	1311	103	1414
% App. Total	27.7	72.3		100	0		92.7	7.3	
PHF	.907	.964	.947	.945	.000	.945	.947	.696	.948

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City of Oceanside
N/S: I-5 SB Off Ramp/Pirates Cove
E/W: Mission Avenue
Weather: Clear

File Name : 04_OCS_5S Off_Pirates Cove_Mission AM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	I-5 Southbound Off Ramp Southbound				Mission Avenue Westbound				Pirates Cove Northbound				Mission Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	20	19	19	58	81	185	132	398	4	0	69	73	0	106	2	108	637
07:15 AM	20	45	28	93	71	268	176	515	9	0	105	114	0	172	4	176	898
07:30 AM	19	7	12	38	19	183	213	415	4	0	36	40	0	129	0	129	622
07:45 AM	31	0	23	54	12	235	197	444	0	0	9	9	0	95	0	95	602
Total	90	71	82	243	183	871	718	1772	17	0	219	236	0	502	6	508	2759
08:00 AM	18	1	12	31	14	190	176	380	1	0	6	7	0	119	1	120	538
08:15 AM	25	2	10	37	15	159	161	335	0	0	11	11	0	116	2	118	501
08:30 AM	28	2	11	41	10	191	155	356	3	0	9	12	0	142	1	143	552
08:45 AM	19	1	16	36	7	221	143	371	0	0	2	2	0	133	1	134	543
Total	90	6	49	145	46	761	635	1442	4	0	28	32	0	510	5	515	2134
Grand Total	180	77	131	388	229	1632	1353	3214	21	0	247	268	0	1012	11	1023	4893
Apprch %	46.4	19.8	33.8		7.1	50.8	42.1		7.8	0	92.2		0	98.9	1.1		
Total %	3.7	1.6	2.7	7.9	4.7	33.4	27.7	65.7	0.4	0	5	5.5	0	20.7	0.2	20.9	

	I-5 Southbound Off Ramp Southbound				Mission Avenue Westbound				Pirates Cove Northbound				Mission Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	20	19	19	58	**81**	185	132	398	4	0	69	73	0	106	2	108	637
07:15 AM	20	**45**	**28**	**93**	71	**268**	176	**515**	**9**	0	**105**	**114**	0	**172**	**4**	**176**	**898**
07:30 AM	19	7	12	38	19	183	**213**	415	4	0	36	40	0	129	0	129	622
07:45 AM	**31**	0	23	54	12	235	197	444	0	0	9	9	0	95	0	95	602
Total Volume	90	71	82	243	183	871	718	1772	17	0	219	236	0	502	6	508	2759
% App. Total	37	29.2	33.7		10.3	49.2	40.5		7.2	0	92.8		0	98.8	1.2		
PHF	.726	.394	.732	.653	.565	.813	.843	.860	.472	.000	.521	.518	.000	.730	.375	.722	.768

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E/W: Mission Avenue
Weather: Clear

File Name : 04_OCS_5S Off_Pirates Cove_Mission AM
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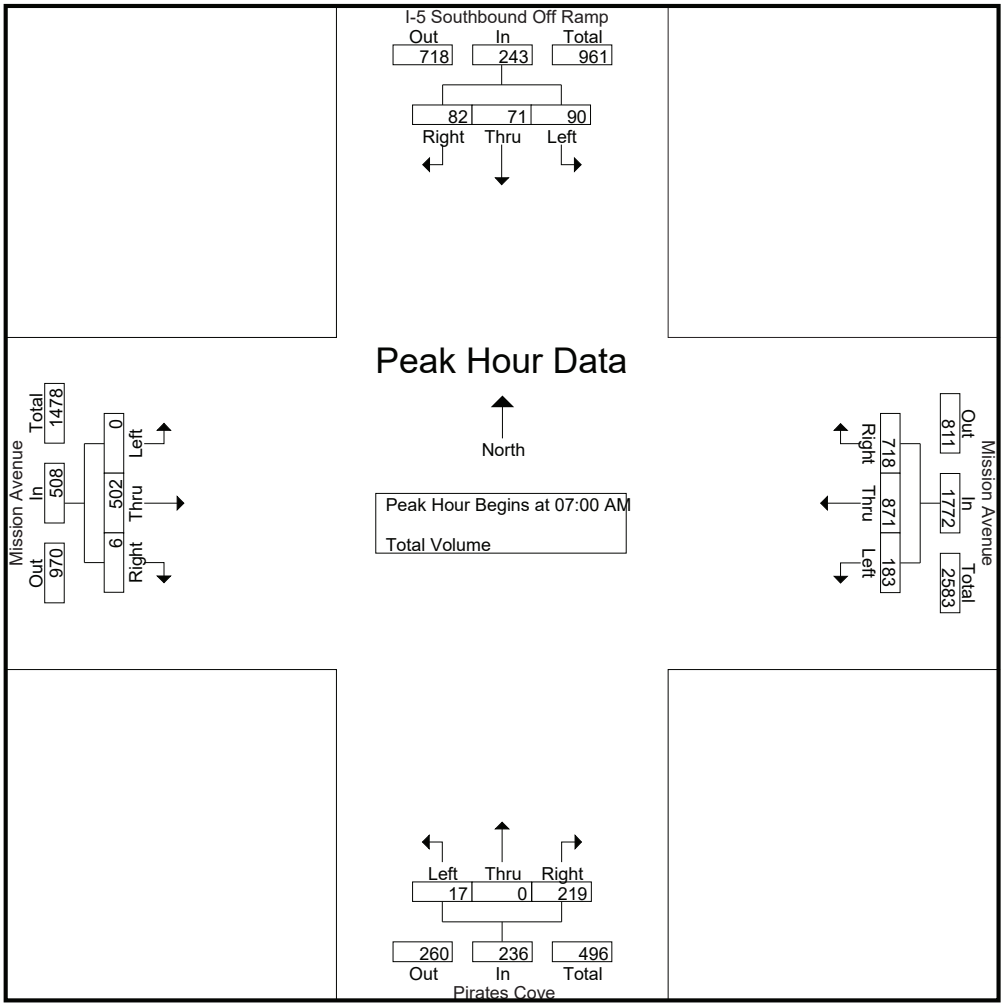

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				07:00 AM				07:15 AM			
+0 mins.	20	19	19	58	**81**	185	132	398	4	0	69	73	0	**172**	**4**	**176**
+15 mins.	20	**45**	**28**	**93**	71	**268**	176	**515**	**9**	0	**105**	**114**	0	129	0	129
+30 mins.	19	7	12	38	19	183	**213**	415	4	0	36	40	0	95	0	95
+45 mins.	**31**	0	23	54	12	235	197	444	0	0	9	9	0	119	1	120
Total Volume	90	71	82	243	183	871	718	1772	17	0	219	236	0	515	5	520
% App. Total	37	29.2	33.7		10.3	49.2	40.5		7.2	0	92.8		0	99	1	
PHF	.726	.394	.732	.653	.565	.813	.843	.860	.472	.000	.521	.518	.000	.749	.313	.739

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City of Oceanside
N/S: I-5 SB Off Ramp/Pirates Cove
E/W: Mission Avenue
Weather: Clear

File Name : 04_OCS_5S Off_Pirates Cove_Mission PM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	I-5 Southbound Off Ramp Southbound				Mission Avenue Westbound				Pirates Cove Northbound				Mission Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	61	4	27	92	20	236	157	413	4	0	20	24	0	233	2	235	764
04:15 PM	82	8	28	118	18	225	115	358	4	0	17	21	0	211	1	212	709
04:30 PM	86	4	27	117	24	272	115	411	1	0	21	22	0	253	3	256	806
04:45 PM	79	4	31	114	40	260	117	417	1	0	9	10	0	250	3	253	794
Total	308	20	113	441	102	993	504	1599	10	0	67	77	0	947	9	956	3073
05:00 PM	91	5	35	131	48	247	116	411	3	0	24	27	0	304	1	305	874
05:15 PM	67	5	32	104	51	238	102	391	3	0	8	11	0	287	3	290	796
05:30 PM	63	6	37	106	21	227	105	353	14	0	29	43	0	260	7	267	769
05:45 PM	51	3	32	86	21	258	116	395	11	0	36	47	0	201	3	204	732
Total	272	19	136	427	141	970	439	1550	31	0	97	128	0	1052	14	1066	3171
Grand Total	580	39	249	868	243	1963	943	3149	41	0	164	205	0	1999	23	2022	6244
Apprch %	66.8	4.5	28.7		7.7	62.3	29.9		20	0	80		0	98.9	1.1		
Total %	9.3	0.6	4	13.9	3.9	31.4	15.1	50.4	0.7	0	2.6	3.3	0	32	0.4	32.4	

	I-5 Southbound Off Ramp Southbound				Mission Avenue Westbound				Pirates Cove Northbound				Mission Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	86	4	27	117	24	**272**	115	411	1	0	21	22	0	253	**3**	256	806
04:45 PM	79	4	31	114	40	260	**117**	**417**	1	0	9	10	0	250	3	253	794
05:00 PM	**91**	**5**	**35**	**131**	48	247	116	411	**3**	0	**24**	**27**	0	**304**	1	**305**	**874**
05:15 PM	67	5	32	104	**51**	238	102	391	3	0	8	11	0	287	3	290	796
Total Volume	323	18	125	466	163	1017	450	1630	8	0	62	70	0	1094	10	1104	3270
% App. Total	69.3	3.9	26.8		10	62.4	27.6		11.4	0	88.6		0	99.1	0.9		
PHF	.887	.900	.893	.889	.799	.935	.962	.977	.667	.000	.646	.648	.000	.900	.833	.905	.935

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E/W: Mission Avenue
Weather: Clear

File Name : 04_OCS_5S Off_Pirates Cove_Mission PM
Site Code :
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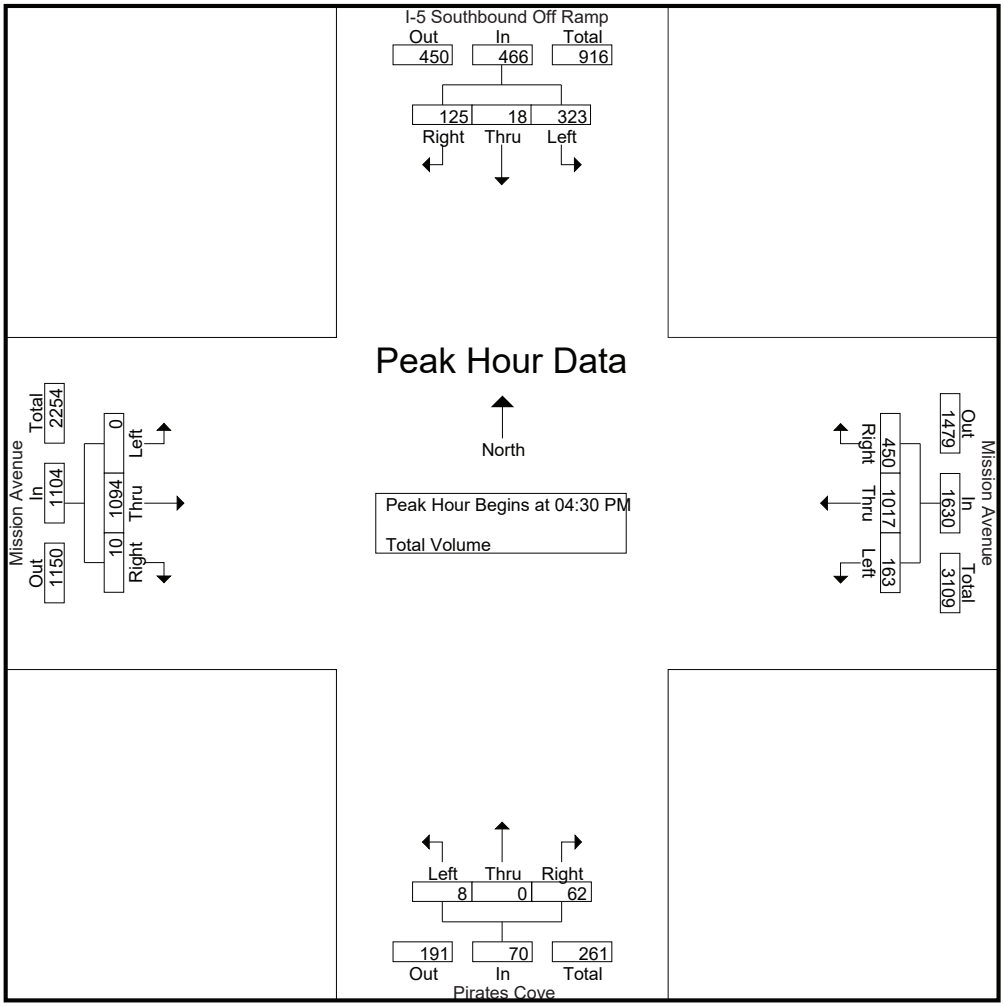

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:15 PM				04:30 PM				05:00 PM				04:45 PM			
+0 mins.	82	**8**	28	118	24	**272**	115	411	3	0	24	27	0	250	3	253
+15 mins.	86	4	27	117	40	260	**117**	**417**	3	0	8	11	0	**304**	1	**305**
+30 mins.	79	4	31	114	48	247	116	411	**14**	0	29	43	0	287	3	290
+45 mins.	**91**	5	**35**	**131**	**51**	238	102	391	11	0	**36**	**47**	0	260	**7**	267
Total Volume	338	21	121	480	163	1017	450	1630	31	0	97	128	0	1101	14	1115
% App. Total	70.4	4.4	25.2		10	62.4	27.6		24.2	0	75.8		0	98.7	1.3	
PHF	.929	.656	.864	.916	.799	.935	.962	.977	.554	.000	.674	.681	.000	.905	.500	.914

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City of Oceanside
N/S: I-5 Northbound Ramps
E/W: Mission Avenue
Weather: Clear

File Name : 05_OCS_5N On_Mission AM
Site Code :
Start Date : 3/13/2018
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Groups Printed- Total Volume

	I-5 Northbound On Ramp Southbound				Mission Avenue Westbound				I-5 Northbound Off Ramp Northbound				Mission Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	0	0	0	0	305	56	361	0	0	103	103	20	93	0	113	577
07:15 AM	0	0	0	0	0	355	78	433	0	0	125	125	31	142	0	173	731
07:30 AM	0	0	0	0	0	333	82	415	0	0	112	112	25	87	0	112	639
07:45 AM	0	0	0	0	0	321	59	380	0	0	110	110	11	69	0	80	570
Total	0	0	0	0	0	1314	275	1589	0	0	450	450	87	391	0	478	2517
08:00 AM	0	0	0	0	0	282	40	322	0	0	129	129	16	63	0	79	530
08:15 AM	0	0	0	0	0	252	42	294	0	0	154	154	17	69	0	86	534
08:30 AM	0	0	0	0	0	246	38	284	0	0	126	126	23	73	0	96	506
08:45 AM	0	0	0	0	0	250	36	286	0	0	101	101	14	62	0	76	463
Total	0	0	0	0	0	1030	156	1186	0	0	510	510	70	267	0	337	2033
Grand Total	0	0	0	0	0	2344	431	2775	0	0	960	960	157	658	0	815	4550
Apprch %	0	0	0		0	84.5	15.5		0	0	100		19.3	80.7	0		
Total %	0	0	0	0	0	51.5	9.5	61	0	0	21.1	21.1	3.5	14.5	0	17.9	

	I-5 Northbound On Ramp Southbound				Mission Avenue Westbound				I-5 Northbound Off Ramp Northbound				Mission Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	0	305	56	361	0	0	103	103	20	93	0	113	577
07:15 AM	0	0	0	0	0	**355**	78	**433**	0	0	**125**	**125**	**31**	**142**	0	**173**	**731**
07:30 AM	0	0	0	0	0	333	**82**	415	0	0	112	112	25	87	0	112	639
07:45 AM	0	0	0	0	0	321	59	380	0	0	110	110	11	69	0	80	570
Total Volume	0	0	0	0	0	1314	275	1589	0	0	450	450	87	391	0	478	2517
% App. Total	0	0	0		0	82.7	17.3		0	0	100		18.2	81.8	0		
PHF	.000	.000	.000	.000	.000	.925	.838	.917	.000	.000	.900	.900	.702	.688	.000	.691	.861

Counts Unlimited
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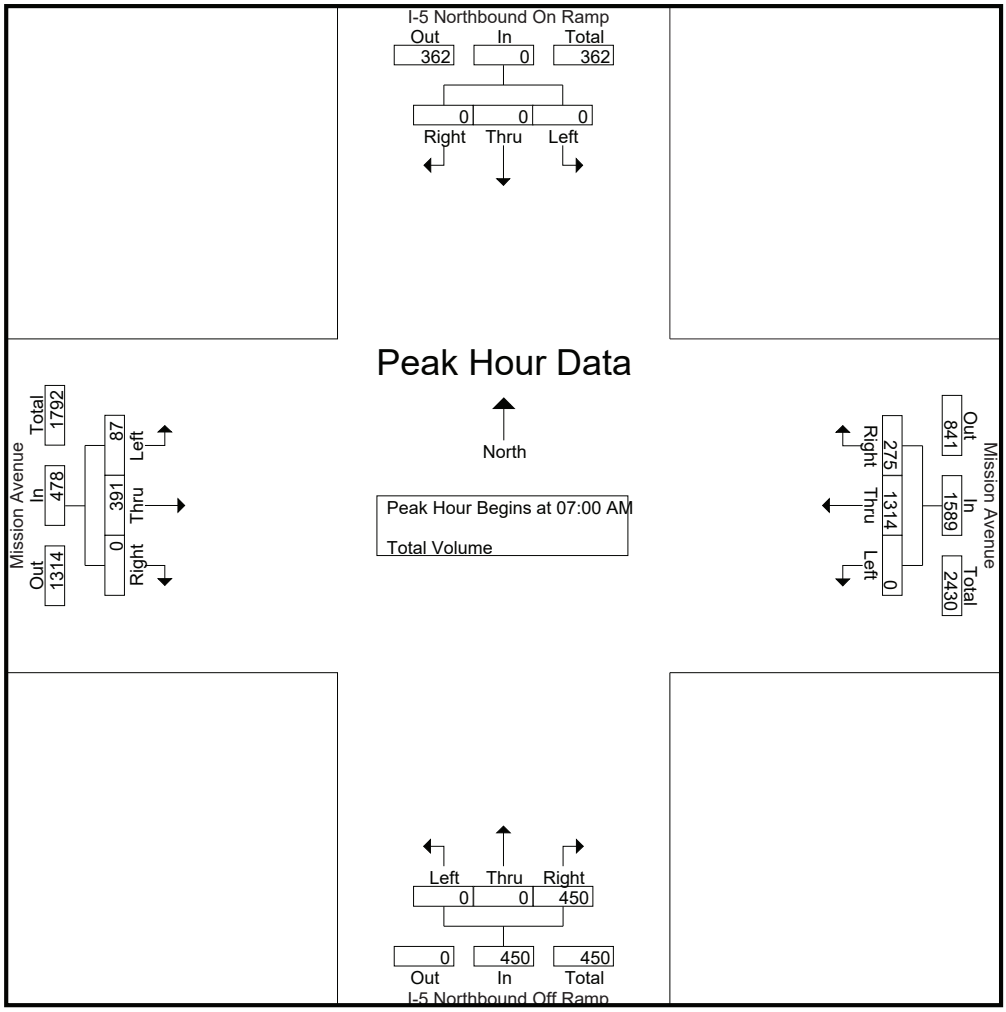
City of Oceanside
N/S: I-5 Northbound Ramps
E/W: Mission Avenue
Weather: Clear

File Name : 05_OCS_5N On_Mission AM
Site Code :
Start Date : 3/13/2018



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				07:45 AM				07:00 AM			
+0 mins.	0	0	0	0	0	305	56	361	0	0	110	110	20	93	0	113
+15 mins.	0	0	0	0	0	**355**	78	**433**	0	0	129	129	**31**	**142**	0	**173**
+30 mins.	0	0	0	0	0	333	**82**	415	0	0	**154**	**154**	25	87	0	112
+45 mins.	0	0	0	0	0	321	59	380	0	0	126	126	11	69	0	80
Total Volume	0	0	0	0	0	1314	275	1589	0	0	519	519	87	391	0	478
% App. Total	0	0	0		0	82.7	17.3		0	0	100		18.2	81.8	0	
PHF	.000	.000	.000	.000	.000	.925	.838	.917	.000	.000	.843	.843	.702	.688	.000	.691

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City of Oceanside
N/S: I-5 Northbound Ramps
E/W: Mission Avenue
Weather: Clear

File Name : 05_OCS_5N On_Mission PM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	I-5 Northbound On Ramp Southbound				Mission Avenue Westbound				I-5 Northbound Off Ramp Northbound				Mission Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	0	266	29	295	0	0	216	216	22	161	0	183	694
04:15 PM	0	0	0	0	0	224	31	255	0	0	220	220	13	188	0	201	676
04:30 PM	0	0	0	0	0	222	21	243	0	0	183	183	38	208	0	246	672
04:45 PM	0	0	0	0	0	209	26	235	0	0	172	172	32	229	0	261	668
Total	0	0	0	0	0	921	107	1028	0	0	791	791	105	786	0	891	2710
05:00 PM	0	0	0	0	0	217	30	247	0	0	169	169	35	234	0	269	685
05:15 PM	0	0	0	0	0	195	27	222	0	0	185	185	23	225	0	248	655
05:30 PM	0	0	0	0	0	187	27	214	0	0	211	211	30	195	0	225	650
05:45 PM	0	0	0	0	0	221	20	241	0	0	199	199	32	166	0	198	638
Total	0	0	0	0	0	820	104	924	0	0	764	764	120	820	0	940	2628
Grand Total	0	0	0	0	0	1741	211	1952	0	0	1555	1555	225	1606	0	1831	5338
Apprch %	0	0	0		0	89.2	10.8		0	0	100		12.3	87.7	0		
Total %	0	0	0	0	0	32.6	4	36.6	0	0	29.1	29.1	4.2	30.1	0	34.3	

	I-5 Northbound On Ramp Southbound				Mission Avenue Westbound				I-5 Northbound Off Ramp Northbound				Mission Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	0	0	0	0	0	**266**	29	**295**	0	0	216	216	22	161	0	183	**694**
04:15 PM	0	0	0	0	0	224	**31**	255	0	0	**220**	**220**	13	188	0	201	676
04:30 PM	0	0	0	0	0	222	21	243	0	0	183	183	**38**	208	0	246	672
04:45 PM	0	0	0	0	0	209	26	235	0	0	172	172	32	**229**	0	**261**	668
Total Volume	0	0	0	0	0	921	107	1028	0	0	791	791	105	786	0	891	2710
% App. Total	0	0	0		0	89.6	10.4		0	0	100		11.8	88.2	0		
PHF	.000	.000	.000	.000	.000	.866	.863	.871	.000	.000	.899	.899	.691	.858	.000	.853	.976

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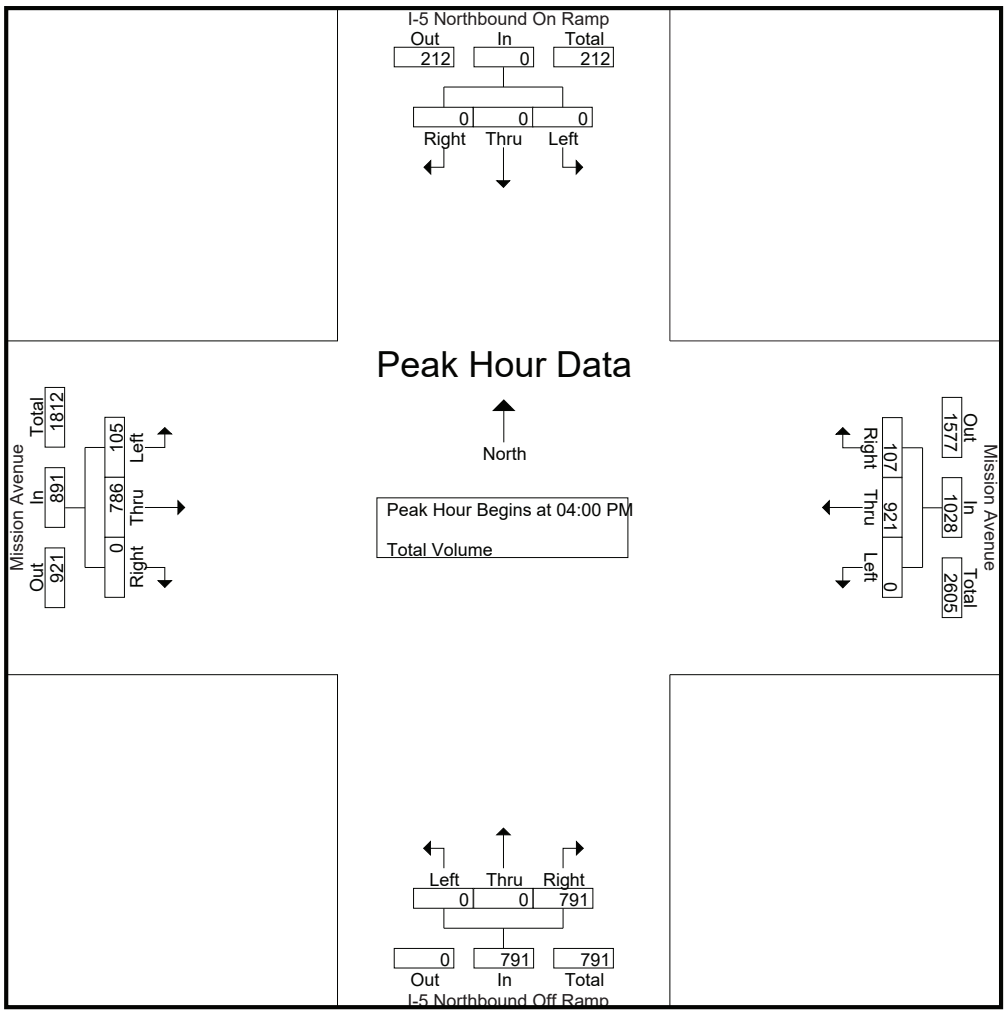
City of Oceanside
N/S: I-5 Northbound Ramps
E/W: Mission Avenue
Weather: Clear

File Name : 05_OCS_5N On_Mission PM
Site Code :
Start Date : 3/13/2018
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:00 PM				04:00 PM				04:30 PM			
+0 mins.	0	0	0	0	0	**266**	29	**295**	0	0	216	216	**38**	208	0	246
+15 mins.	0	0	0	0	0	224	**31**	255	0	0	**220**	**220**	32	229	0	261
+30 mins.	0	0	0	0	0	222	21	243	0	0	183	183	35	**234**	0	**269**
+45 mins.	0	0	0	0	0	209	26	235	0	0	172	172	23	225	0	248
Total Volume	0	0	0	0	0	921	107	1028	0	0	791	791	128	896	0	1024
% App. Total	0	0	0		0	89.6	10.4		0	0	100		12.5	87.5	0	
PHF	.000	.000	.000	.000	.000	.866	.863	.871	.000	.000	.899	.899	.842	.957	.000	.952

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City of Oceanside
N/S: I-5 SB Ramps/Parkwood Lane
E/W: Oceanside Boulevard
Weather: Clear

File Name : 06_OCS_5S_Parkwood_Oceanside AM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	I-5 Southbound Ramps Southbound				Oceanside Boulevard Westbound				Parkwood Lane Northbound				Oceanside Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	58	4	41	103	3	132	98	233	10	5	12	27	77	103	2	182	545
07:15 AM	44	0	8	52	3	141	103	247	8	6	16	30	77	110	5	192	521
07:30 AM	44	1	14	59	11	114	170	295	3	8	7	18	79	85	5	169	541
07:45 AM	51	0	17	68	5	130	135	270	3	10	13	26	92	95	1	188	552
Total	197	5	80	282	22	517	506	1045	24	29	48	101	325	393	13	731	2159
08:00 AM	63	3	15	81	5	120	109	234	3	9	7	19	79	95	4	178	512
08:15 AM	53	2	14	69	4	132	138	274	1	3	8	12	69	89	3	161	516
08:30 AM	55	3	10	68	10	126	129	265	2	11	10	23	76	93	5	174	530
08:45 AM	45	1	18	64	6	128	114	248	1	7	4	12	77	93	2	172	496
Total	216	9	57	282	25	506	490	1021	7	30	29	66	301	370	14	685	2054
Grand Total	413	14	137	564	47	1023	996	2066	31	59	77	167	626	763	27	1416	4213
Apprch %	73.2	2.5	24.3		2.3	49.5	48.2		18.6	35.3	46.1		44.2	53.9	1.9		
Total %	9.8	0.3	3.3	13.4	1.1	24.3	23.6	49	0.7	1.4	1.8	4	14.9	18.1	0.6	33.6	

	I-5 Southbound Ramps Southbound				Oceanside Boulevard Westbound				Parkwood Lane Northbound				Oceanside Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	**58**	**4**	**41**	**103**	3	132	98	233	**10**	5	12	27	77	103	2	182	545
07:15 AM	44	0	8	52	3	**141**	103	247	8	6	**16**	**30**	77	**110**	**5**	**192**	521
07:30 AM	44	1	14	59	**11**	114	**170**	**295**	3	8	7	18	79	85	5	169	541
07:45 AM	51	0	17	68	5	130	135	270	3	**10**	13	26	**92**	95	1	188	**552**
Total Volume	197	5	80	282	22	517	506	1045	24	29	48	101	325	393	13	731	2159
% App. Total	69.9	1.8	28.4		2.1	49.5	48.4		23.8	28.7	47.5		44.5	53.8	1.8		
PHF	.849	.313	.488	.684	.500	.917	.744	.886	.600	.725	.750	.842	.883	.893	.650	.952	.978

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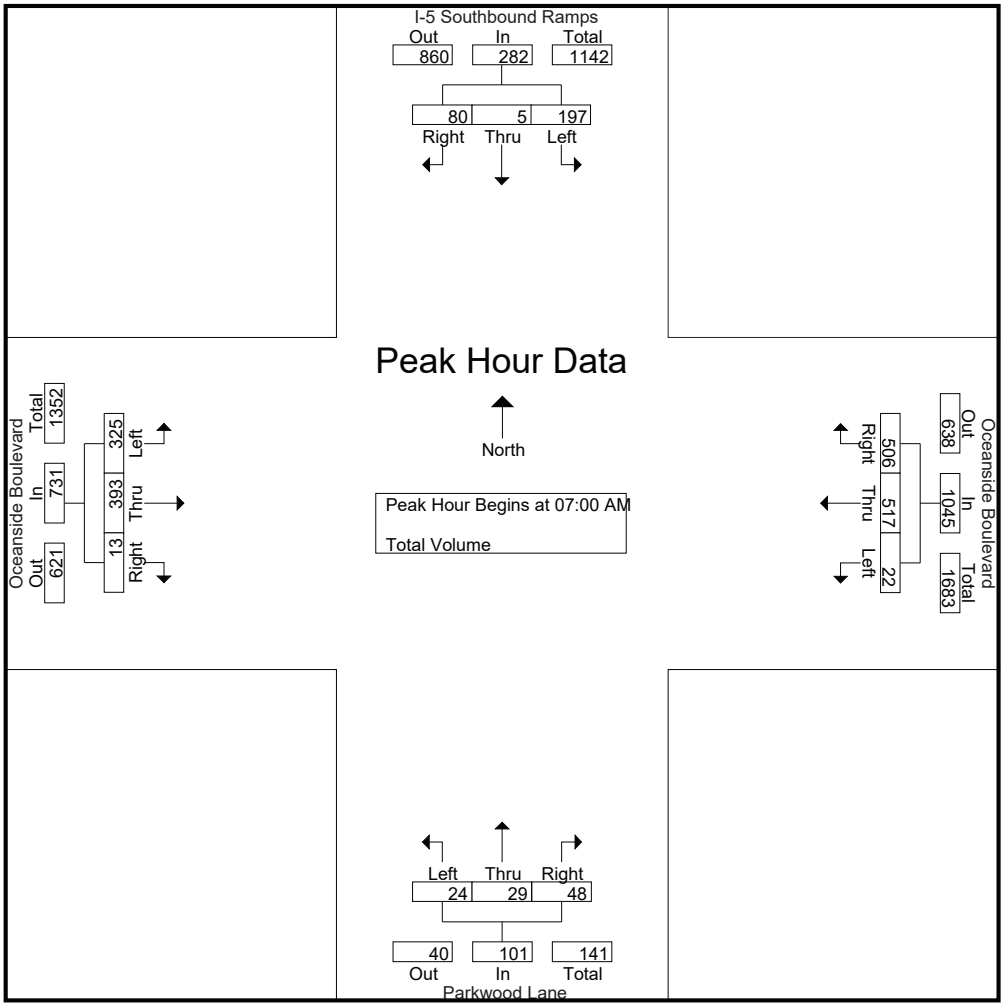
City of Oceanside
N/S: I-5 SB Ramps/Parkwood Lane
E/W: Oceanside Boulevard
Weather: Clear

File Name : 06_OCS_5S_Parkwood_Oceanside AM
Site Code :
Start Date : 3/13/2018
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:45 AM				07:30 AM				07:00 AM				07:00 AM			
+0 mins.	51	0	**17**	68	**11**	114	**170**	**295**	**10**	5	12	27	77	103	2	182
+15 mins.	**63**	**3**	15	**81**	5	130	135	270	8	6	**16**	**30**	77	**110**	**5**	**192**
+30 mins.	53	2	14	69	5	120	109	234	3	8	7	18	79	85	5	169
+45 mins.	55	3	10	68	4	**132**	138	274	3	**10**	13	26	**92**	95	1	188
Total Volume	222	8	56	286	25	496	552	1073	24	29	48	101	325	393	13	731
% App. Total	77.6	2.8	19.6		2.3	46.2	51.4		23.8	28.7	47.5		44.5	53.8	1.8	
PHF	.881	.667	.824	.883	.568	.939	.812	.909	.600	.725	.750	.842	.883	.893	.650	.952

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City of Oceanside
N/S: I-5 SB Ramps/Parkwood Lane
E/W: Oceanside Boulevard
Weather: Clear

File Name : 06_OCS_5S_Parkwood_Oceanside PM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	I-5 Southbound Ramps Southbound				Oceanside Boulevard Westbound				Parkwood Lane Northbound				Oceanside Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	82	2	24	108	17	222	124	363	6	3	14	23	76	139	4	219	713
04:15 PM	89	3	28	120	14	216	86	316	6	0	9	15	76	134	7	217	668
04:30 PM	88	4	34	126	15	185	87	287	3	6	16	25	65	133	7	205	643
04:45 PM	115	3	33	151	11	247	109	367	3	0	12	15	64	147	3	214	747
Total	374	12	119	505	57	870	406	1333	18	9	51	78	281	553	21	855	2771
05:00 PM	105	4	23	132	21	220	131	372	7	2	6	15	57	166	7	230	749
05:15 PM	97	9	19	125	23	191	105	319	9	3	10	22	59	142	8	209	675
05:30 PM	100	3	28	131	14	199	81	294	2	2	9	13	72	129	5	206	644
05:45 PM	84	3	19	106	22	247	68	337	4	2	8	14	65	132	10	207	664
Total	386	19	89	494	80	857	385	1322	22	9	33	64	253	569	30	852	2732
Grand Total	760	31	208	999	137	1727	791	2655	40	18	84	142	534	1122	51	1707	5503
Apprch %	76.1	3.1	20.8		5.2	65	29.8		28.2	12.7	59.2		31.3	65.7	3		
Total %	13.8	0.6	3.8	18.2	2.5	31.4	14.4	48.2	0.7	0.3	1.5	2.6	9.7	20.4	0.9	31	

	I-5 Southbound Ramps Southbound				Oceanside Boulevard Westbound				Parkwood Lane Northbound				Oceanside Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	**115**	3	**33**	**151**	11	**247**	109	367	3	0	**12**	15	64	147	3	214	747
05:00 PM	105	4	23	132	21	220	**131**	**372**	7	2	6	15	57	**166**	7	**230**	**749**
05:15 PM	97	**9**	19	125	**23**	191	105	319	**9**	**3**	10	**22**	59	142	**8**	209	675
05:30 PM	100	3	28	131	14	199	81	294	2	2	9	13	**72**	129	5	206	644
Total Volume	417	19	103	539	69	857	426	1352	21	7	37	65	252	584	23	859	2815
% App. Total	77.4	3.5	19.1		5.1	63.4	31.5		32.3	10.8	56.9		29.3	68	2.7		
PHF	.907	.528	.780	.892	.750	.867	.813	.909	.583	.583	.771	.739	.875	.880	.719	.934	.940

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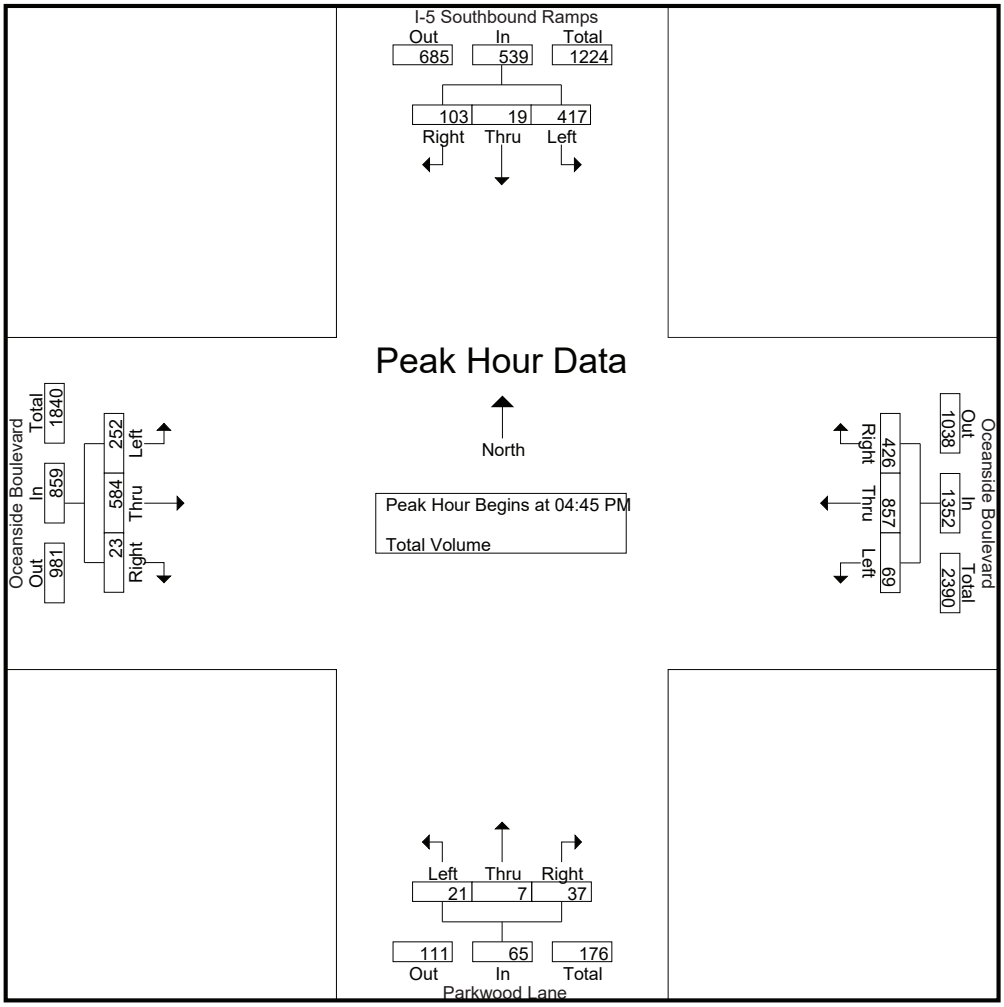
City of Oceanside
N/S: I-5 SB Ramps/Parkwood Lane
E/W: Oceanside Boulevard
Weather: Clear

File Name : 06_OCS_5S_Parkwood_Oceanside PM
Site Code :
Start Date : 3/13/2018
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:45 PM				04:00 PM				04:15 PM			
+0 mins.	**115**	3	**33**	**151**	11	**247**	109	367	**6**	3	14	23	**76**	134	**7**	217
+15 mins.	105	4	23	132	21	220	**131**	**372**	6	0	9	15	65	133	7	205
+30 mins.	97	**9**	19	125	**23**	191	105	319	3	**6**	**16**	**25**	64	147	3	214
+45 mins.	100	3	28	131	14	199	81	294	3	0	12	15	57	**166**	7	**230**
Total Volume	417	19	103	539	69	857	426	1352	18	9	51	78	262	580	24	866
% App. Total	77.4	3.5	19.1		5.1	63.4	31.5		23.1	11.5	65.4		30.3	67	2.8	
PHF	.907	.528	.780	.892	.750	.867	.813	.909	.750	.375	.797	.780	.862	.873	.857	.941

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City of Oceanside
N/S: I-5 NB Ramps/Commerce Street
E/W: Oceanside Boulevard
Weather: Clear

File Name : 07_OCS_5N_Commerce_Oceanside AM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	I-5 Northbound Ramps Southbound				Oceanside Boulevard Westbound				Commerce Street Northbound				Oceanside Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	49	25	48	122	11	166	78	255	18	20	9	47	31	121	26	178	602
07:15 AM	49	32	59	140	15	164	90	269	23	15	6	44	37	111	25	173	626
07:30 AM	66	28	52	146	6	226	74	306	33	25	7	65	17	85	33	135	652
07:45 AM	95	42	51	188	10	194	62	266	27	14	11	52	21	114	31	166	672
Total	259	127	210	596	42	750	304	1096	101	74	33	208	106	431	115	652	2552
08:00 AM	74	47	48	169	12	157	58	227	28	12	7	47	22	102	41	165	608
08:15 AM	81	38	72	191	15	171	63	249	39	23	16	78	26	77	38	141	659
08:30 AM	81	40	43	164	13	166	50	229	26	16	8	50	23	109	24	156	599
08:45 AM	94	34	62	190	17	158	50	225	42	23	7	72	17	102	29	148	635
Total	330	159	225	714	57	652	221	930	135	74	38	247	88	390	132	610	2501
Grand Total	589	286	435	1310	99	1402	525	2026	236	148	71	455	194	821	247	1262	5053
Apprch %	45	21.8	33.2		4.9	69.2	25.9		51.9	32.5	15.6		15.4	65.1	19.6		
Total %	11.7	5.7	8.6	25.9	2	27.7	10.4	40.1	4.7	2.9	1.4	9	3.8	16.2	4.9	25	

	I-5 Northbound Ramps Southbound				Oceanside Boulevard Westbound				Commerce Street Northbound				Oceanside Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	66	28	52	146	6	**226**	**74**	**306**	33	**25**	7	65	17	85	33	135	652
07:45 AM	**95**	42	51	188	10	194	62	266	27	14	11	52	21	**114**	31	**166**	**672**
08:00 AM	74	**47**	48	169	12	157	58	227	28	12	7	47	22	102	**41**	165	608
08:15 AM	81	38	**72**	**191**	**15**	171	63	249	**39**	23	**16**	**78**	**26**	77	38	141	659
Total Volume	316	155	223	694	43	748	257	1048	127	74	41	242	86	378	143	607	2591
% App. Total	45.5	22.3	32.1		4.1	71.4	24.5		52.5	30.6	16.9		14.2	62.3	23.6		
PHF	.832	.824	.774	.908	.717	.827	.868	.856	.814	.740	.641	.776	.827	.829	.872	.914	.964

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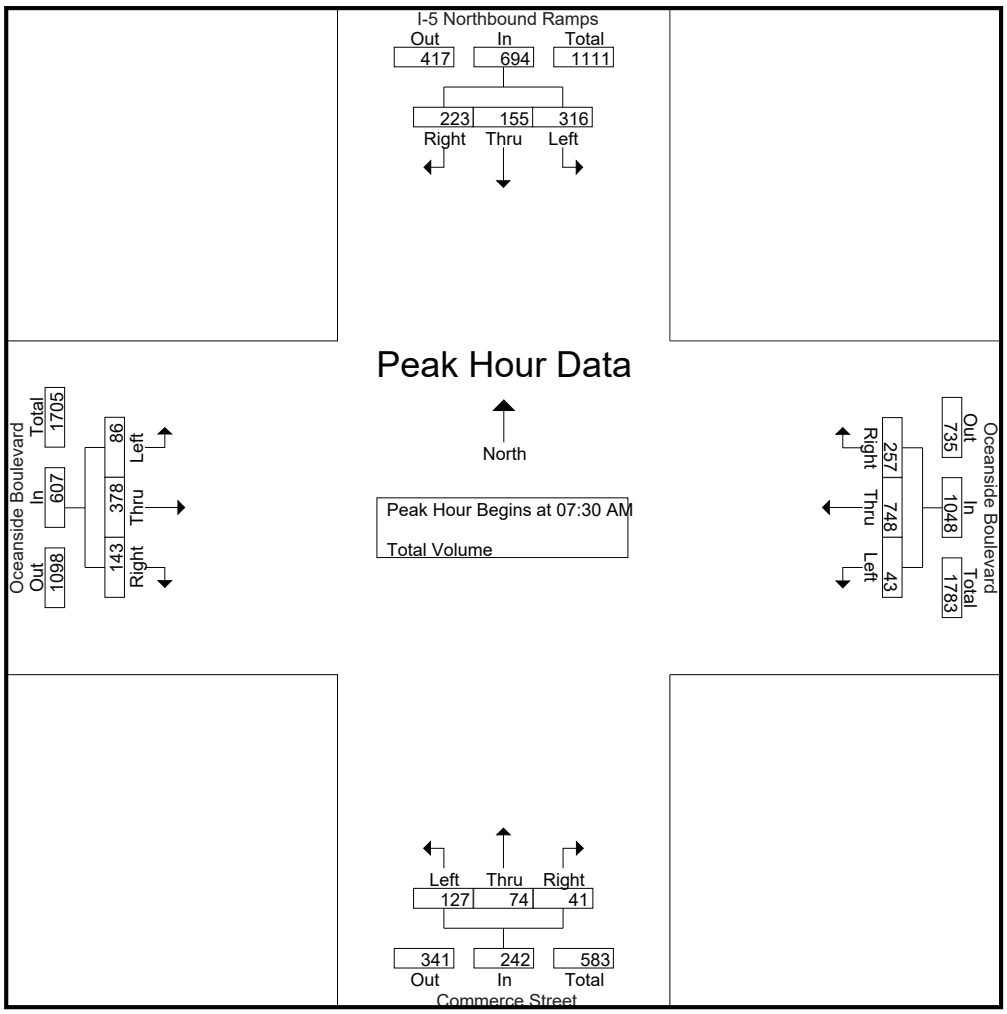
City of Oceanside
N/S: I-5 NB Ramps/Commerce Street
E/W: Oceanside Boulevard
Weather: Clear

File Name : 07_OCS_5N_Commerce_Oceanside AM
Site Code :
Start Date : 3/13/2018
Page No : 2



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				07:00 AM				08:00 AM				07:00 AM			
+0 mins.	74	**47**	48	169	11	166	78	255	28	12	7	47	31	**121**	26	**178**
+15 mins.	81	38	**72**	**191**	**15**	164	**90**	269	39	**23**	**16**	**78**	**37**	111	25	173
+30 mins.	81	40	43	164	6	**226**	74	**306**	26	16	8	50	17	85	**33**	135
+45 mins.	**94**	34	62	190	10	194	62	266	**42**	23	7	72	21	114	31	166
Total Volume	330	159	225	714	42	750	304	1096	135	74	38	247	106	431	115	652
% App. Total	46.2	22.3	31.5		3.8	68.4	27.7		54.7	30	15.4		16.3	66.1	17.6	
PHF	.878	.846	.781	.935	.700	.830	.844	.895	.804	.804	.594	.792	.716	.890	.871	.916

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City of Oceanside
N/S: I-5 NB Ramps/Commerce Street
E/W: Oceanside Boulevard
Weather: Clear

File Name : 07_OCS_5N_Commerce_Oceanside PM
Site Code :
Start Date : 3/13/2018

Groups Printed- Total Volume

	I-5 Northbound Ramps Southbound				Oceanside Boulevard Westbound				Commerce Street Northbound				Oceanside Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	137	26	110	273	6	196	62	264	44	20	14	78	18	188	28	234	849
04:15 PM	136	33	127	296	8	153	54	215	39	14	17	70	14	182	36	232	813
04:30 PM	144	26	108	278	6	140	44	190	46	8	14	68	17	204	17	238	774
04:45 PM	151	31	127	309	9	213	69	291	35	11	13	59	23	212	32	267	926
Total	568	116	472	1156	29	702	229	960	164	53	58	275	72	786	113	971	3362
05:00 PM	146	38	109	293	15	183	61	259	66	15	17	98	21	220	35	276	926
05:15 PM	168	31	114	313	10	172	60	242	45	20	19	84	15	204	37	256	895
05:30 PM	147	36	99	282	11	167	69	247	31	10	23	64	11	198	35	244	837
05:45 PM	121	26	126	273	11	152	64	227	40	24	20	84	21	194	28	243	827
Total	582	131	448	1161	47	674	254	975	182	69	79	330	68	816	135	1019	3485
Grand Total	1150	247	920	2317	76	1376	483	1935	346	122	137	605	140	1602	248	1990	6847
Apprch %	49.6	10.7	39.7		3.9	71.1	25		57.2	20.2	22.6		7	80.5	12.5		
Total %	16.8	3.6	13.4	33.8	1.1	20.1	7.1	28.3	5.1	1.8	2	8.8	2	23.4	3.6	29.1	

	I-5 Northbound Ramps Southbound				Oceanside Boulevard Westbound				Commerce Street Northbound				Oceanside Boulevard Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	151	31	**127**	309	9	**213**	**69**	**291**	35	11	13	59	**23**	212	32	267	**926**
05:00 PM	146	**38**	109	293	**15**	183	61	259	**66**	15	17	**98**	21	**220**	35	**276**	926
05:15 PM	**168**	31	114	**313**	10	172	60	242	45	**20**	19	84	15	204	**37**	256	895
05:30 PM	147	36	99	282	11	167	69	247	31	10	**23**	64	11	198	35	244	837
Total Volume	612	136	449	1197	45	735	259	1039	177	56	72	305	70	834	139	1043	3584
% App. Total	51.1	11.4	37.5		4.3	70.7	24.9		58	18.4	23.6		6.7	80	13.3		
PHF	.911	.895	.884	.956	.750	.863	.938	.893	.670	.700	.783	.778	.761	.948	.939	.945	.968

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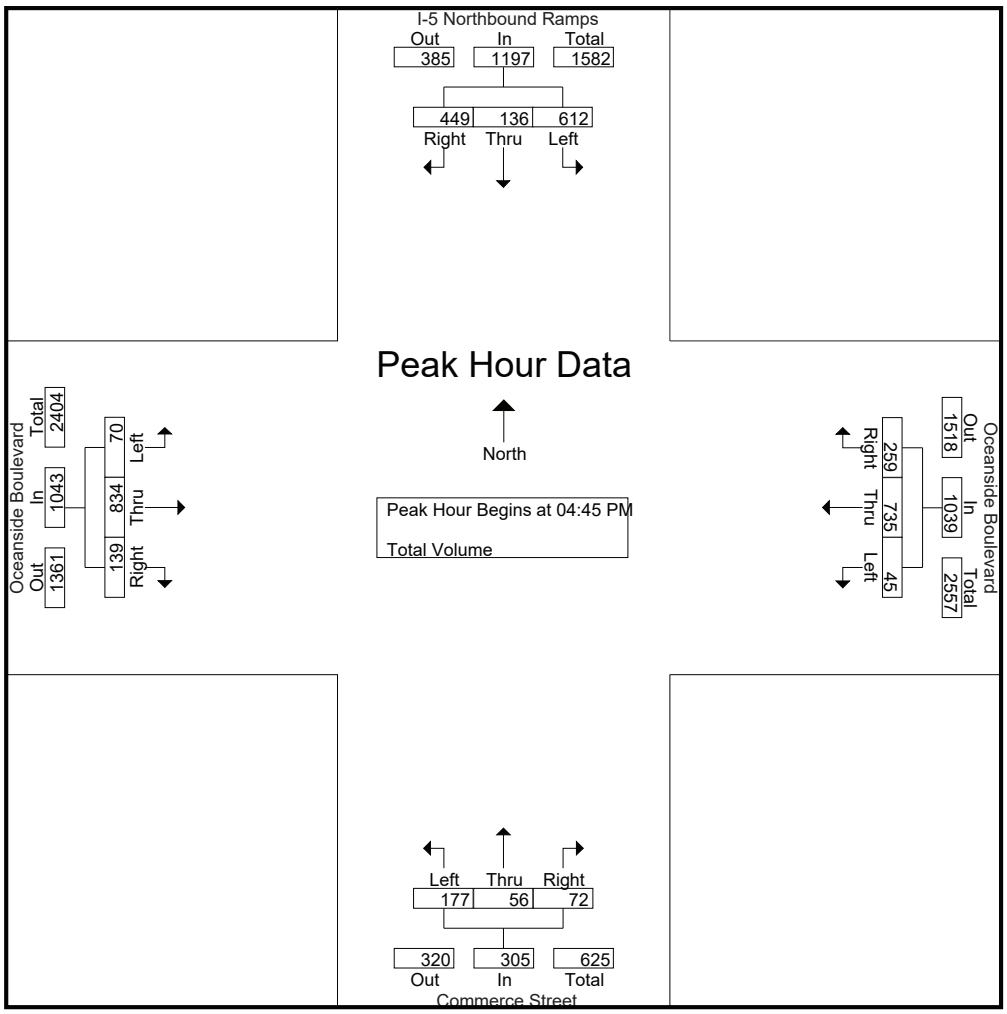
City of Oceanside
N/S: I-5 NB Ramps/Commerce Street
E/W: Oceanside Boulevard
Weather: Clear

File Name : 07_OCS_5N_Commerce_Oceanside PM
Site Code :
Start Date : 3/13/2018



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:45 PM				04:45 PM				05:00 PM				04:45 PM			
+0 mins.	151	31	**127**	309	9	**213**	**69**	**291**	**66**	15	17	**98**	**23**	212	32	267
+15 mins.	146	**38**	109	293	**15**	183	61	259	45	20	19	84	21	**220**	35	**276**
+30 mins.	**168**	31	114	**313**	10	172	60	242	31	10	**23**	64	15	204	**37**	256
+45 mins.	147	36	99	282	11	167	69	247	40	**24**	20	84	11	198	35	244
Total Volume	612	136	449	1197	45	735	259	1039	182	69	79	330	70	834	139	1043
% App. Total	51.1	11.4	37.5		4.3	70.7	24.9		55.2	20.9	23.9		6.7	80	13.3	
PHF	.911	.895	.884	.956	.750	.863	.938	.893	.689	.719	.859	.842	.761	.948	.939	.945

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City of Oceanside
N/S: I-5 NB On Ramp/Soto Street
E/W: California Street
Weather: Clear

File Name : 08_OCS_5N_California AM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	I-5 Northbound On Ramp Southbound				California Street Westbound				Soto Street Northbound				California Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	0	0	0	0	11	17	51	79	0	28	4	32	10	34	3	47	158
07:15 AM	0	0	0	0	23	31	70	124	2	16	8	26	8	36	5	49	199
07:30 AM	0	0	0	0	19	16	23	58	1	22	4	27	9	11	2	22	107
07:45 AM	0	0	0	0	9	6	21	36	0	18	6	24	16	12	3	31	91
Total	0	0	0	0	62	70	165	297	3	84	22	109	43	93	13	149	555
08:00 AM	0	0	0	0	18	16	23	57	0	22	6	28	12	21	6	39	124
08:15 AM	0	0	0	0	11	25	18	54	2	33	3	38	14	8	4	26	118
08:30 AM	0	0	0	0	6	15	15	36	0	37	3	40	22	6	2	30	106
08:45 AM	0	0	0	0	7	22	7	36	2	34	5	41	31	20	2	53	130
Total	0	0	0	0	42	78	63	183	4	126	17	147	79	55	14	148	478
Grand Total	0	0	0	0	104	148	228	480	7	210	39	256	122	148	27	297	1033
Apprch %	0	0	0		21.7	30.8	47.5		2.7	82	15.2		41.1	49.8	9.1		
Total %	0	0	0	0	10.1	14.3	22.1	46.5	0.7	20.3	3.8	24.8	11.8	14.3	2.6	28.8	

	I-5 Northbound On Ramp Southbound				California Street Westbound				Soto Street Northbound				California Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00 AM																	
07:00 AM	0	0	0	0	11	17	51	79	0	**28**	4	**32**	10	34	3	47	158
07:15 AM	0	0	0	0	**23**	**31**	**70**	**124**	**2**	16	**8**	26	8	**36**	**5**	**49**	**199**
07:30 AM	0	0	0	0	19	16	23	58	1	22	4	27	9	11	2	22	107
07:45 AM	0	0	0	0	9	6	21	36	0	18	6	24	**16**	12	3	31	91
Total Volume	0	0	0	0	62	70	165	297	3	84	22	109	43	93	13	149	555
% App. Total	0	0	0		20.9	23.6	55.6		2.8	77.1	20.2		28.9	62.4	8.7		
PHF	.000	.000	.000	.000	.674	.565	.589	.599	.375	.750	.688	.852	.672	.646	.650	.760	.697

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City of Oceanside
N/S: I-5 NB On Ramp/Soto Street
E/W: California Street
Weather: Clear

File Name : 08_OCS_5N_California AM
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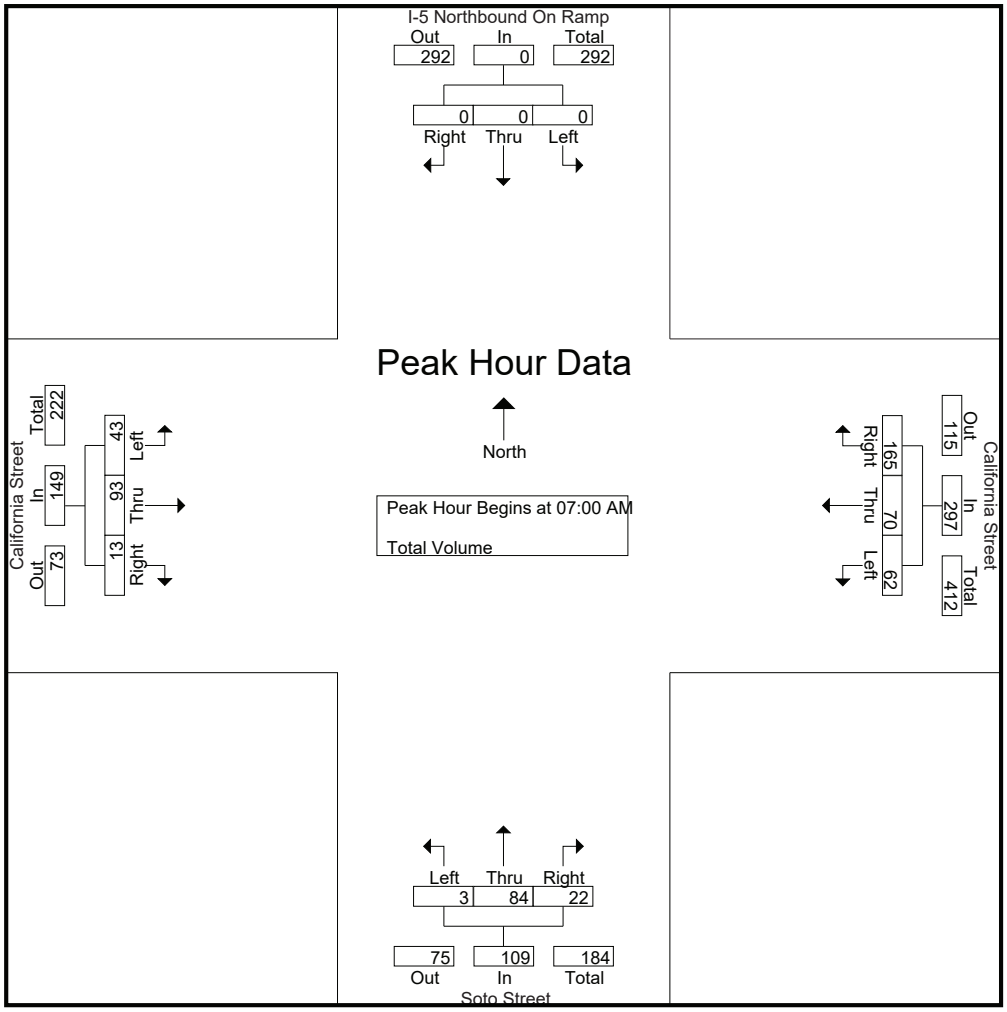

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	07:00 AM				07:00 AM				08:00 AM				07:00 AM			
+0 mins.	0	0	0	0	11	17	51	79	0	22	**6**	28	10	34	3	47
+15 mins.	0	0	0	0	**23**	**31**	**70**	**124**	**2**	33	3	38	8	**36**	**5**	**49**
+30 mins.	0	0	0	0	19	16	23	58	0	**37**	3	40	9	11	2	22
+45 mins.	0	0	0	0	9	6	21	36	2	34	5	**41**	**16**	12	3	31
Total Volume	0	0	0	0	62	70	165	297	4	126	17	147	43	93	13	149
% App. Total	0	0	0		20.9	23.6	55.6		2.7	85.7	11.6		28.9	62.4	8.7	
PHF	.000	.000	.000	.000	.674	.565	.589	.599	.500	.851	.708	.896	.672	.646	.650	.760

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City of Oceanside
N/S: I-5 NB On Ramp/Soto Street
E/W: California Street
Weather: Clear

File Name : 08_OCS_5N_California PM
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Groups Printed- Total Volume

	I-5 Northbound On Ramp Southbound				California Street Westbound				Soto Street Northbound				California Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	0	0	0	0	5	21	6	32	1	19	12	32	15	19	4	38	102
04:15 PM	0	0	0	0	9	32	11	52	0	21	9	30	10	24	3	37	119
04:30 PM	0	0	0	0	4	24	9	37	2	26	11	39	6	19	1	26	102
04:45 PM	0	0	0	0	5	18	8	31	1	21	6	28	14	19	5	38	97
Total	0	0	0	0	23	95	34	152	4	87	38	129	45	81	13	139	420
05:00 PM	0	0	0	0	9	19	11	39	4	18	6	28	10	23	3	36	103
05:15 PM	0	0	0	0	9	14	5	28	1	23	12	36	13	23	5	41	105
05:30 PM	0	0	0	0	9	19	21	49	2	18	12	32	7	24	3	34	115
05:45 PM	0	0	0	0	8	19	6	33	2	20	9	31	12	15	2	29	93
Total	0	0	0	0	35	71	43	149	9	79	39	127	42	85	13	140	416
Grand Total	0	0	0	0	58	166	77	301	13	166	77	256	87	166	26	279	836
Apprch %	0	0	0		19.3	55.1	25.6		5.1	64.8	30.1		31.2	59.5	9.3		
Total %	0	0	0	0	6.9	19.9	9.2	36	1.6	19.9	9.2	30.6	10.4	19.9	3.1	33.4	

	I-5 Northbound On Ramp Southbound				California Street Westbound				Soto Street Northbound				California Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	0	0	0	0	**9**	**32**	**11**	**52**	0	21	9	30	10	**24**	3	37	**119**
04:30 PM	0	0	0	0	4	24	9	37	2	**26**	**11**	**39**	6	19	1	26	102
04:45 PM	0	0	0	0	5	18	8	31	1	21	6	28	**14**	19	**5**	**38**	97
05:00 PM	0	0	0	0	9	19	11	39	**4**	18	6	28	10	23	3	36	103
Total Volume	0	0	0	0	27	93	39	159	7	86	32	125	40	85	12	137	421
% App. Total	0	0	0		17	58.5	24.5		5.6	68.8	25.6		29.2	62	8.8		
PHF	.000	.000	.000	.000	.750	.727	.886	.764	.438	.827	.727	.801	.714	.885	.600	.901	.884

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E/W: California Street
Weather: Clear

File Name : 08_OCS_5N_California PM
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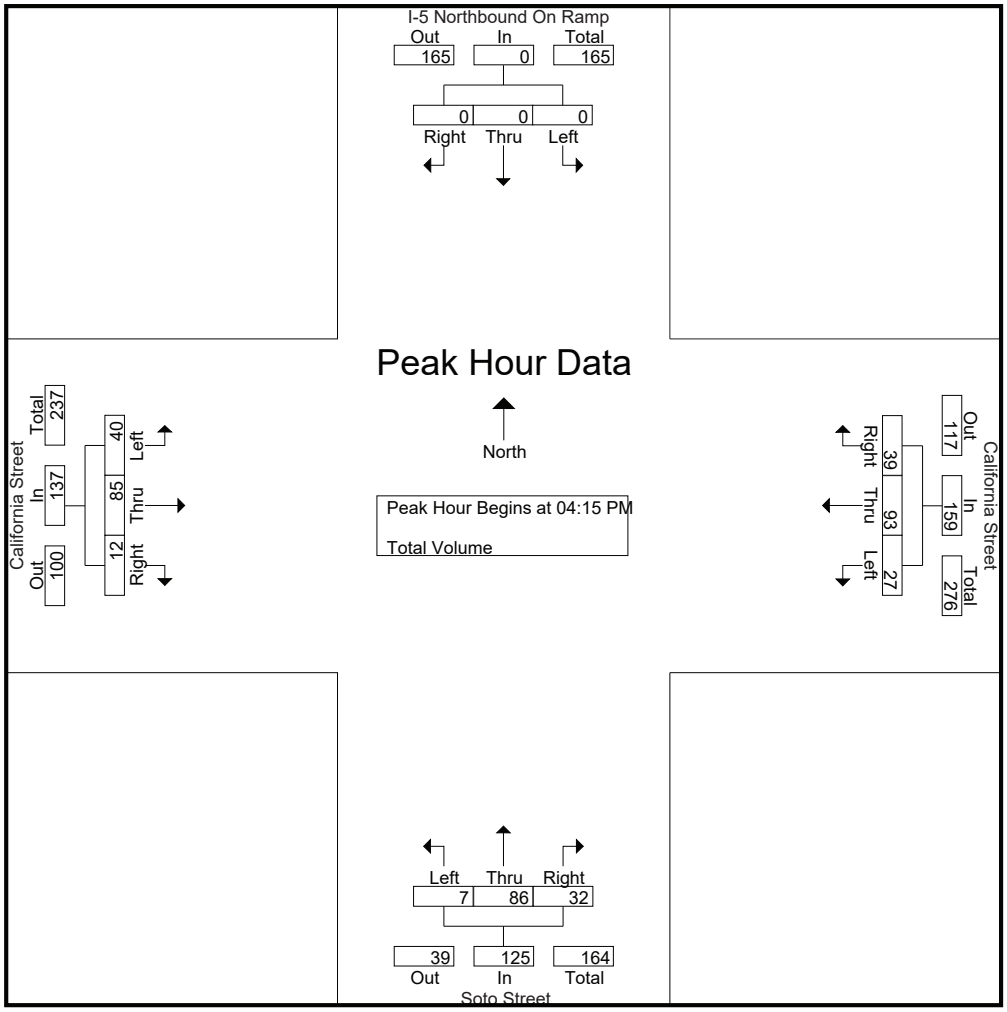

Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:00 PM				04:15 PM				04:30 PM				04:45 PM			
+0 mins.	0	0	0	0	**9**	**32**	**11**	**52**	2	**26**	11	**39**	**14**	19	**5**	38
+15 mins.	0	0	0	0	4	24	9	37	1	21	6	28	10	23	3	36
+30 mins.	0	0	0	0	5	18	8	31	**4**	18	6	28	13	23	5	**41**
+45 mins.	0	0	0	0	9	19	11	39	1	23	**12**	36	7	**24**	3	34
Total Volume	0	0	0	0	27	93	39	159	8	88	35	131	44	89	16	149
% App. Total	0	0	0		17	58.5	24.5		6.1	67.2	26.7		29.5	59.7	10.7	
PHF	.000	.000	.000	.000	.750	.727	.886	.764	.500	.846	.729	.840	.786	.927	.800	.909

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City of Oceanside
N/S: I-5 Southbound Ramps
E/W: Cassidy Street
Weather: Clear

File Name : 09_OCS_5S_Cassidy AM
Site Code :
Start Date : 3/13/2018
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Groups Printed- Total Volume

	I-5 Southbound Off Ramp Southbound				Cassidy Street Westbound				I-5 Southbound On Ramp Northbound				Cassidy Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
07:00 AM	9	0	19	28	57	22	0	79	0	0	0	0	0	45	53	98	205
07:15 AM	33	0	14	47	66	21	0	87	0	0	0	0	0	45	55	100	234
07:30 AM	12	0	14	26	78	12	0	90	0	0	0	0	0	40	69	109	225
07:45 AM	13	0	19	32	50	11	0	61	0	0	0	0	0	34	67	101	194
Total	67	0	66	133	251	66	0	317	0	0	0	0	0	164	244	408	858
08:00 AM	12	0	20	32	46	12	0	58	0	0	0	0	0	49	59	108	198
08:15 AM	14	0	24	38	56	25	0	81	0	0	0	0	0	48	71	119	238
08:30 AM	13	0	37	50	37	23	0	60	0	0	0	0	0	51	62	113	223
08:45 AM	1	0	52	53	24	23	0	47	0	0	0	0	0	59	75	134	234
Total	40	0	133	173	163	83	0	246	0	0	0	0	0	207	267	474	893
Grand Total	107	0	199	306	414	149	0	563	0	0	0	0	0	371	511	882	1751
Apprch %	35	0	65		73.5	26.5	0		0	0	0		0	42.1	57.9		
Total %	6.1	0	11.4	17.5	23.6	8.5	0	32.2	0	0	0	0	0	21.2	29.2	50.4	

	I-5 Southbound Off Ramp Southbound				Cassidy Street Westbound				I-5 Southbound On Ramp Northbound				Cassidy Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:00 AM																	
08:00 AM	12	0	20	32	46	12	0	58	0	0	0	0	0	49	59	108	198
08:15 AM	**14**	0	24	38	**56**	**25**	0	**81**	0	0	0	0	0	48	71	119	**238**
08:30 AM	13	0	37	50	37	23	0	60	0	0	0	0	0	51	62	113	223
08:45 AM	1	0	**52**	**53**	24	23	0	47	0	0	0	0	0	**59**	**75**	**134**	234
Total Volume	40	0	133	173	163	83	0	246	0	0	0	0	0	207	267	474	893
% App. Total	23.1	0	76.9		66.3	33.7	0		0	0	0		0	43.7	56.3		
PHF	.714	.000	.639	.816	.728	.830	.000	.759	.000	.000	.000	.000	.000	.877	.890	.884	.938

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City of Oceanside
N/S: I-5 Southbound Ramps
E/W: Cassidy Street
Weather: Clear

File Name : 09_OCS_5S_Cassidy AM
Site Code :
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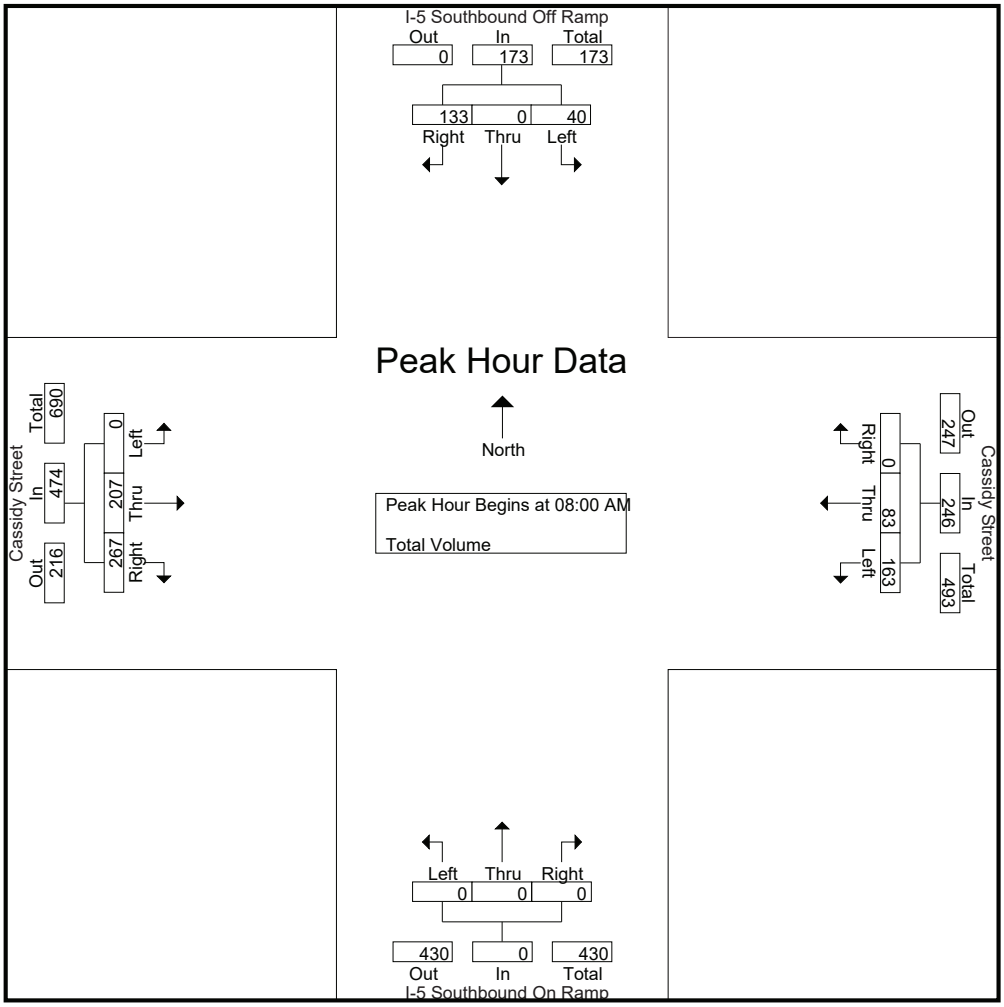

Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM				07:00 AM				07:00 AM				08:00 AM			
+0 mins.	12	0	20	32	57	**22**	0	79	0	0	0	0	0	49	59	108
+15 mins.	**14**	0	24	38	66	21	0	87	0	0	0	0	0	48	71	119
+30 mins.	13	0	37	50	**78**	12	0	**90**	0	0	0	0	0	51	62	113
+45 mins.	1	0	**52**	**53**	50	11	0	61	0	0	0	0	0	**59**	**75**	**134**
Total Volume	40	0	133	173	251	66	0	317	0	0	0	0	0	207	267	474
% App. Total	23.1	0	76.9		79.2	20.8	0		0	0	0		0	43.7	56.3	
PHF	.714	.000	.639	.816	.804	.750	.000	.881	.000	.000	.000	.000	.000	.877	.890	.884

Counts Unlimited
PO Box 1178
Corona, CA 92878
(951) 268-6268

City of Oceanside
N/S: I-5 Southbound Ramps
E/W: Cassidy Street
Weather: Clear

File Name : 09_OCS_5S_Cassidy PM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	I-5 Southbound Off Ramp Southbound				Cassidy Street Westbound				I-5 Southbound On Ramp Northbound				Cassidy Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
04:00 PM	15	0	22	37	26	9	0	35	0	0	0	0	0	68	57	125	197
04:15 PM	12	0	38	50	25	14	0	39	0	0	0	0	0	71	57	128	217
04:30 PM	23	0	25	48	28	12	0	40	0	0	0	0	0	70	42	112	200
04:45 PM	15	0	25	40	23	14	0	37	0	0	0	0	0	64	58	122	199
Total	65	0	110	175	102	49	0	151	0	0	0	0	0	273	214	487	813
05:00 PM	15	0	34	49	22	14	0	36	0	0	0	0	0	62	48	110	195
05:15 PM	10	0	30	40	28	15	0	43	0	0	0	0	0	78	56	134	217
05:30 PM	18	0	25	43	23	17	0	40	0	0	0	0	0	66	47	113	196
05:45 PM	14	0	27	41	15	16	0	31	0	0	0	0	0	50	47	97	169
Total	57	0	116	173	88	62	0	150	0	0	0	0	0	256	198	454	777
Grand Total	122	0	226	348	190	111	0	301	0	0	0	0	0	529	412	941	1590
Apprch %	35.1	0	64.9		63.1	36.9	0		0	0	0		0	56.2	43.8		
Total %	7.7	0	14.2	21.9	11.9	7	0	18.9	0	0	0	0	0	33.3	25.9	59.2	

	I-5 Southbound Off Ramp Southbound				Cassidy Street Westbound				I-5 Southbound On Ramp Northbound				Cassidy Street Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:00 PM																	
04:00 PM	15	0	22	37	26	9	0	35	0	0	0	0	0	68	57	125	197
04:15 PM	12	0	**38**	**50**	25	**14**	0	39	0	0	0	0	0	**71**	57	**128**	**217**
04:30 PM	**23**	0	25	48	**28**	12	0	**40**	0	0	0	0	0	70	42	112	200
04:45 PM	15	0	25	40	23	14	0	37	0	0	0	0	0	64	**58**	122	199
Total Volume	65	0	110	175	102	49	0	151	0	0	0	0	0	273	214	487	813
% App. Total	37.1	0	62.9		67.5	32.5	0		0	0	0		0	56.1	43.9		
PHF	.707	.000	.724	.875	.911	.875	.000	.944	.000	.000	.000	.000	.000	.961	.922	.951	.937

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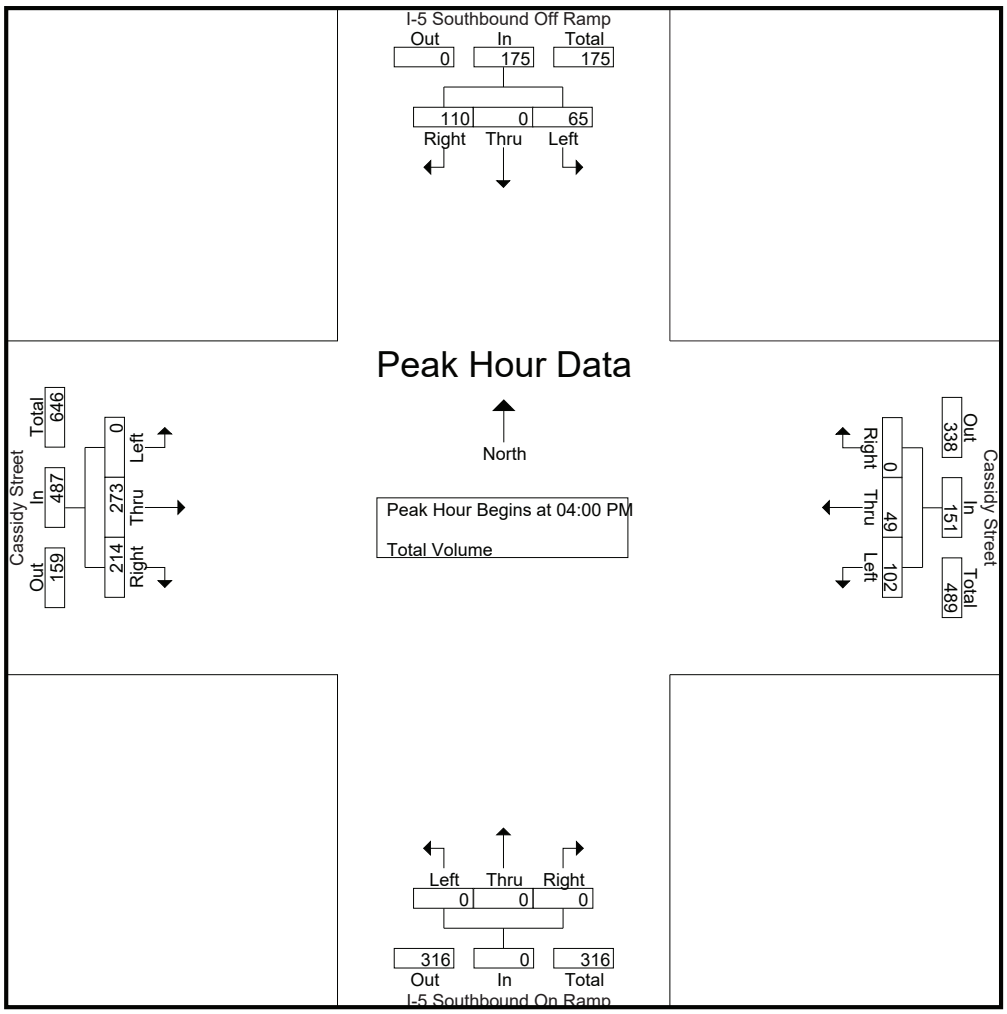
City of Oceanside
N/S: I-5 Southbound Ramps
E/W: Cassidy Street
Weather: Clear

File Name : 09_OCS_5S_Cassidy PM
Site Code :
Start Date : 3/13/2018
Page No : 2



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:15 PM				04:30 PM				04:00 PM				04:00 PM			
+0 mins.	12	0	**38**	**50**	**28**	12	0	40	0	0	0	0	0	68	57	125
+15 mins.	**23**	0	25	48	23	14	0	37	0	0	0	0	0	**71**	57	**128**
+30 mins.	15	0	25	40	22	14	0	36	0	0	0	0	0	70	42	112
+45 mins.	15	0	34	49	28	**15**	0	**43**	0	0	0	0	0	64	**58**	122
Total Volume	65	0	122	187	101	55	0	156	0	0	0	0	0	273	214	487
% App. Total	34.8	0	65.2		64.7	35.3	0		0	0	0		0	56.1	43.9	
PHF	.707	.000	.803	.935	.902	.917	.000	.907	.000	.000	.000	.000	.000	.961	.922	.951

Counts Unlimited
PO Box 1178
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(951) 268-6268

City of Oceanside
N/S: I-5 Southbound Ramps
E/W: Vista Way/Ronald Packard Pkwy(SR78)
Weather: Clear

File Name : 10_OCS_5S_Vista Way_SR-78 AM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	Ronald Packard Parkway (SR-78) Westbound			I-5 Southbound Ramps Northbound			Vista Way Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
07:00 AM	324	178	502	4	362	366	49	30	79	947
07:15 AM	366	148	514	3	477	480	78	16	94	1088
07:30 AM	408	169	577	1	445	446	96	23	119	1142
07:45 AM	429	171	600	3	437	440	63	27	90	1130
Total	1527	666	2193	11	1721	1732	286	96	382	4307
08:00 AM	432	183	615	4	381	385	72	38	110	1110
08:15 AM	470	175	645	2	389	391	63	31	94	1130
08:30 AM	412	166	578	2	400	402	78	28	106	1086
08:45 AM	425	177	602	6	361	367	71	29	100	1069
Total	1739	701	2440	14	1531	1545	284	126	410	4395
Grand Total	3266	1367	4633	25	3252	3277	570	222	792	8702
Apprch %	70.5	29.5		0.8	99.2		72	28		
Total %	37.5	15.7	53.2	0.3	37.4	37.7	6.6	2.6	9.1	

	Ronald Packard Parkway (SR-78) Westbound			I-5 Southbound Ramps Northbound			Vista Way Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	408	169	577	1	**445**	**446**	**96**	23	**119**	**1142**
07:45 AM	429	171	600	3	437	440	63	27	90	1130
08:00 AM	432	**183**	615	**4**	381	385	72	**38**	110	1110
08:15 AM	**470**	175	**645**	2	389	391	63	31	94	1130
Total Volume	1739	698	2437	10	1652	1662	294	119	413	4512
% App. Total	71.4	28.6		0.6	99.4		71.2	28.8		
PHF	.925	.954	.945	.625	.928	.932	.766	.783	.868	.988

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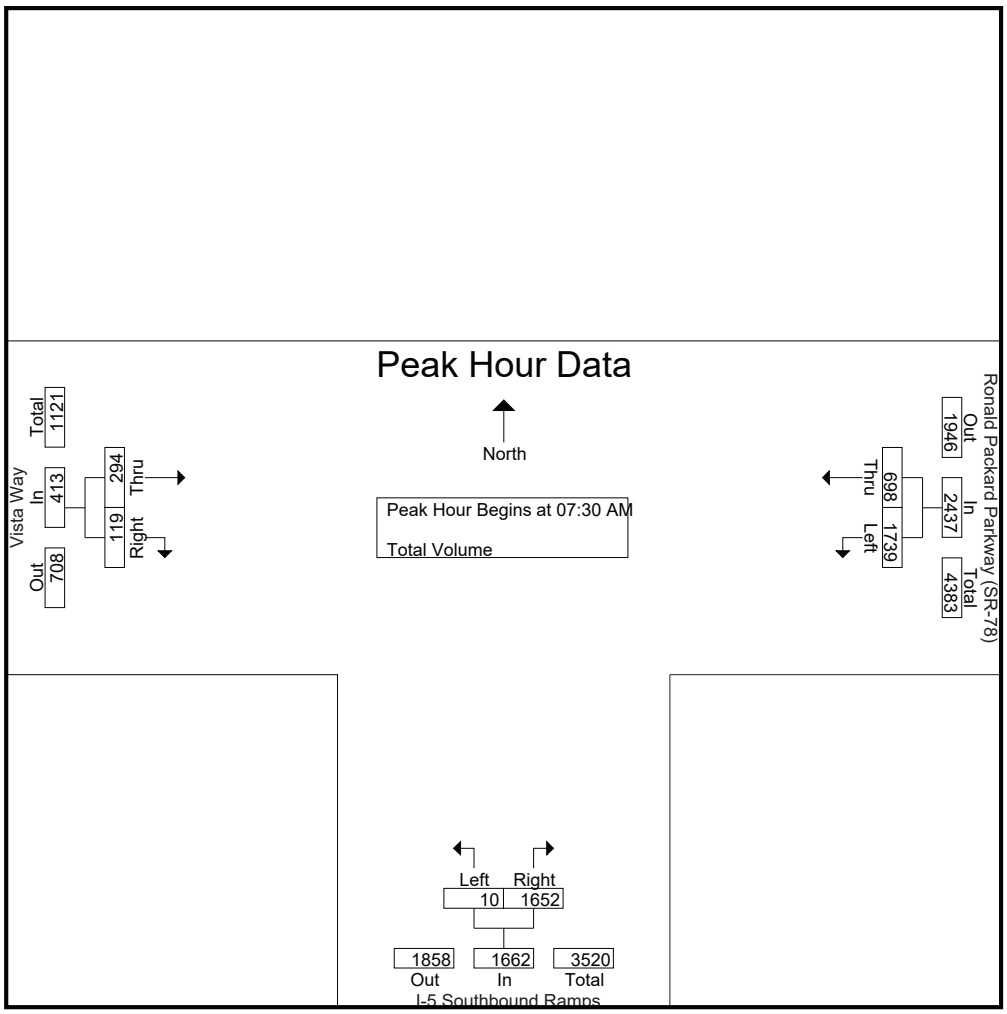
City of Oceanside
N/S: I-5 Southbound Ramps
E/W: Vista Way/Ronald Packard Pkwy(SR78)
Weather: Clear

File Name : 10_OCS_5S_Vista Way_SR-78 AM
Site Code :
Start Date : 3/13/2018



Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	08:00 AM			07:15 AM			07:15 AM		
+0 mins.	432	**183**	615	3	**477**	**480**	78	16	94
+15 mins.	**470**	175	**645**	1	445	446	**96**	23	**119**
+30 mins.	412	166	578	3	437	440	63	27	90
+45 mins.	425	177	602	**4**	381	385	72	**38**	110
Total Volume	1739	701	2440	11	1740	1751	309	104	413
% App. Total	71.3	28.7		0.6	99.4		74.8	25.2	
PHF	.925	.958	.946	.688	.912	.912	.805	.684	.868

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City of Oceanside
N/S: I-5 Southbound Ramps
E/W: Vista Way/Ronald Packard Pkwy(SR78)
Weather: Clear

File Name : 10_OCS_5S_Vista Way_SR-78 PM
Site Code :
Start Date : 3/13/2018
Page No : 1

Groups Printed- Total Volume

	Ronald Packard Parkway (SR-78) Westbound			I-5 Southbound Ramps Northbound			Vista Way Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
04:00 PM	385	208	593	7	574	581	127	21	148	1322
04:15 PM	399	228	627	4	571	575	147	29	176	1378
04:30 PM	391	232	623	11	597	608	144	28	172	1403
04:45 PM	419	237	656	7	581	588	117	14	131	1375
Total	1594	905	2499	29	2323	2352	535	92	627	5478
05:00 PM	390	225	615	6	655	661	128	18	146	1422
05:15 PM	398	233	631	9	607	616	148	21	169	1416
05:30 PM	369	233	602	5	515	520	132	28	160	1282
05:45 PM	283	197	480	4	457	461	121	23	144	1085
Total	1440	888	2328	24	2234	2258	529	90	619	5205
Grand Total	3034	1793	4827	53	4557	4610	1064	182	1246	10683
Apprch %	62.9	37.1		1.1	98.9		85.4	14.6		
Total %	28.4	16.8	45.2	0.5	42.7	43.2	10	1.7	11.7	

	Ronald Packard Parkway (SR-78) Westbound			I-5 Southbound Ramps Northbound			Vista Way Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:30 PM										
04:30 PM	391	232	623	**11**	597	608	144	**28**	**172**	1403
04:45 PM	**419**	**237**	**656**	7	581	588	117	14	131	1375
05:00 PM	390	225	615	6	**655**	**661**	128	18	146	**1422**
05:15 PM	398	233	631	9	607	616	**148**	21	169	1416
Total Volume	1598	927	2525	33	2440	2473	537	81	618	5616
% App. Total	63.3	36.7		1.3	98.7		86.9	13.1		
PHF	.953	.978	.962	.750	.931	.935	.907	.723	.898	.987

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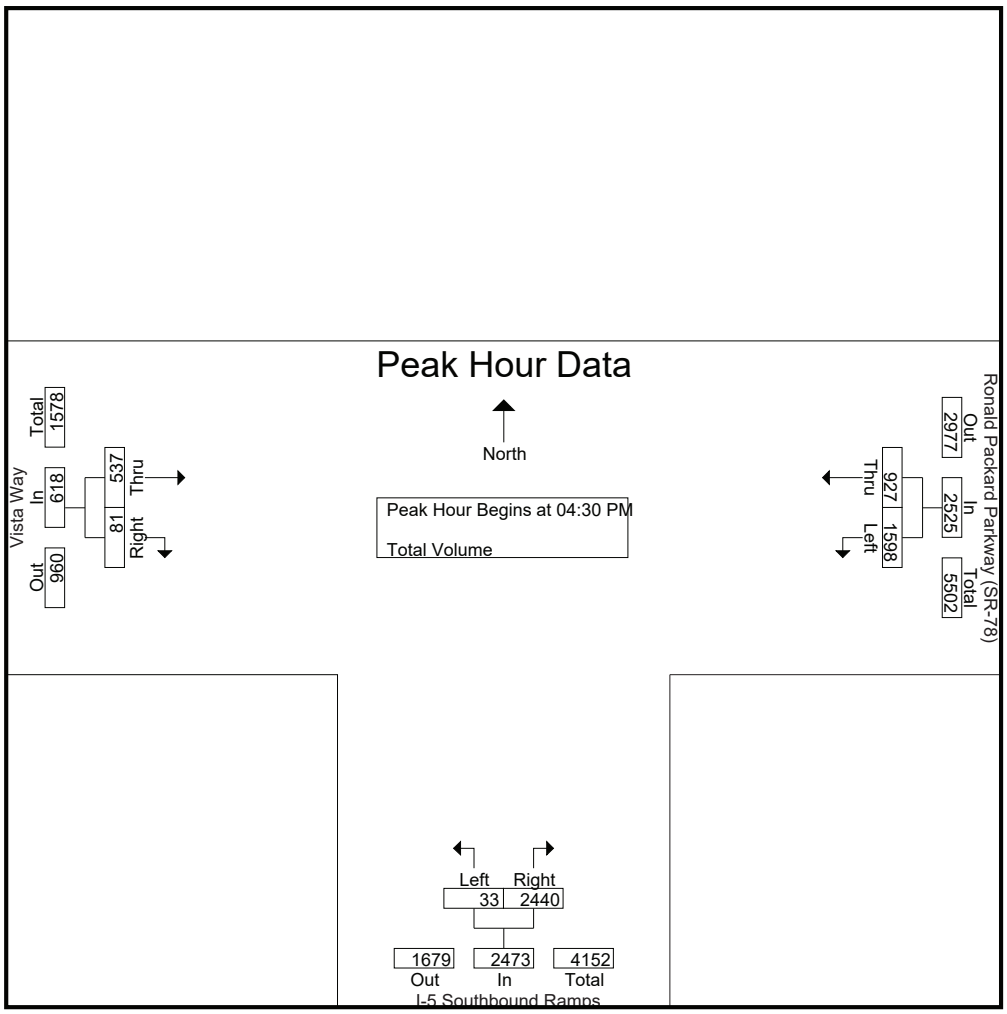
City of Oceanside
N/S: I-5 Southbound Ramps
E/W: Vista Way/Ronald Packard Pkwy(SR78)
Weather: Clear

File Name : 10_OCS_5S_Vista Way_SR-78 PM
Site Code :
Start Date : 3/13/2018



Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1
Peak Hour for Each Approach Begins at:

	04:30 PM			04:30 PM			04:00 PM		
+0 mins.	391	232	623	**11**	597	608	127	21	148
+15 mins.	**419**	**237**	**656**	7	581	588	**147**	**29**	**176**
+30 mins.	390	225	615	6	**655**	**661**	144	28	172
+45 mins.	398	233	631	9	607	616	117	14	131
Total Volume	1598	927	2525	33	2440	2473	535	92	627
% App. Total	63.3	36.7		1.3	98.7		85.3	14.7	
PHF	.953	.978	.962	.750	.931	.935	.910	.793	.891

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Sportfisher Dr & Civic Center Dr

Day: Tuesday
Date: 8/6/2013

City: Oceanside
Project #: CA13_4290_002

DAILY TOTALS	NB	SB	EB	WB	Total
	7,252	8,198	0	0	15,450

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	23		21				44		12:00	120		144				264	
00:15	12		17				29		12:15	115		127				242	
00:30	19		12				31		12:30	117		151				268	
00:45	13	67	6	56			19	123	12:45	139	491	136	558			275	1049
01:00	11		11				22		13:00	128		161				289	
01:15	10		4				14		13:15	128		123				251	
01:30	10		14				24		13:30	123		129				252	
01:45	8	39	8	37			16	76	13:45	145	524	131	544			276	1068
02:00	11		5				16		14:00	129		145				274	
02:15	7		10				17		14:15	133		158				291	
02:30	3		6				9		14:30	121		136				257	
02:45	4	25	1	22			5	47	14:45	139	522	134	573			273	1095
03:00	9		5				14		15:00	121		134				255	
03:15	7		6				13		15:15	127		153				280	
03:30	6		5				11		15:30	137		160				297	
03:45	5	27	7	23			12	50	15:45	120	505	204	651			324	1156
04:00	5		6				11		16:00	165		141				306	
04:15	3		4				7		16:15	116		156				272	
04:30	7		9				16		16:30	151		176				327	
04:45	15	30	26	45			41	75	16:45	145	577	143	616			288	1193
05:00	16		31				47		17:00	137		137				274	
05:15	16		17				33		17:15	163		176				339	
05:30	23		39				62		17:30	158		161				319	
05:45	28	83	52	139			80	222	17:45	144	602	165	639			309	1241
06:00	50		31				81		18:00	143		164				307	
06:15	30		60				90		18:15	123		150				273	
06:30	50		59				109		18:30	136		157				293	
06:45	56	186	74	224			130	410	18:45	147	549	160	631			307	1180
07:00	36		67				103		19:00	130		143				273	
07:15	49		91				140		19:15	116		149				265	
07:30	67		75				142		19:30	133		108				241	
07:45	51	203	93	326			144	529	19:45	119	498	112	512			231	1010
08:00	45		62				107		20:00	109		101				210	
08:15	60		68				128		20:15	104		96				200	
08:30	58		74				132		20:30	76		71				147	
08:45	71	234	97	301			168	535	20:45	72	361	87	355			159	716
09:00	56		83				139		21:00	122		72				194	
09:15	60		108				168		21:15	78		55				133	
09:30	66		108				174		21:30	60		58				118	
09:45	76	258	112	411			188	669	21:45	73	333	56	241			129	574
10:00	86		124				210		22:00	57		48				105	
10:15	94		114				208		22:15	58		43				101	
10:30	89		118				207		22:30	40		40				80	
10:45	96	365	127	483			223	848	22:45	34	189	36	167			70	356
11:00	102		124				226		23:00	40		32				72	
11:15	116		158				274		23:15	33		23				56	
11:30	114		128				242		23:30	27		24				51	
11:45	117	449	135	545			252	994	23:45	35	135	20	99			55	234
TOTALS		1966		2612				4578	TOTALS		5286		5586				10872
SPLIT %		42.9%		57.1%				29.6%	SPLIT %		48.6%		51.4%				70.4%

DAILY TOTALS	NB	SB	EB	WB	Total
	7,252	8,198	0	0	15,450

AM Peak Hour	11:45	11:15				11:15	PM Peak Hour	17:15	15:45				17:15
AM Pk Volume	469	565				1032	PM Pk Volume	608	677				1274
Pk Hr Factor	0.977	0.894				0.942	Pk Hr Factor	0.933	0.830				0.940
7 - 9 Volume	437	627	0	0		1064	4 - 6 Volume	1179	1255	0	0		2434
7 - 9 Peak Hour	08:00	07:00				08:00	4 - 6 Peak Hour	16:45	17:00				17:00
7 - 9 Pk Volume	234	326	0	0		535	4 - 6 Pk Volume	603	639	0	0		1241
Pk Hr Factor	0.824	0.876	0.000	0.000		0.796	Pk Hr Factor	0.925	0.908	0.000	0.000		0.915

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Sportfisher Dr & Civic Center Dr

Day: Wednesday
Date: 8/7/2013

City: Oceanside
Project #: CA13_4290_002

DAILY TOTALS	NB	SB	EB	WB	Total
	7,574	8,240	0	0	15,814

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	29		10				39		12:00	121		152				273	
00:15	20		14				34		12:15	141		163				304	
00:30	28		12				40		12:30	134		146				280	
00:45	15	92	16	52			31	144	12:45	146	542	136	597			282	1139
01:00	20		7				27		13:00	127		157				284	
01:15	18		11				29		13:15	115		115				230	
01:30	8		6				14		13:30	114		141				255	
01:45	21	67	15	39			36	106	13:45	108	464	135	548			243	1012
02:00	9		4				13		14:00	106		131				237	
02:15	5		5				10		14:15	120		138				258	
02:30	3		3				6		14:30	124		144				268	
02:45	5	22	1	13			6	35	14:45	103	453	111	524			214	977
03:00	3		6				9		15:00	128		131				259	
03:15	3		4				7		15:15	131		140				271	
03:30	3		4				7		15:30	141		134				275	
03:45	3	12	7	21			10	33	15:45	118	518	148	553			266	1071
04:00	2		8				10		16:00	144		138				282	
04:15	12		4				16		16:15	122		168				290	
04:30	12		17				29		16:30	146		171				317	
04:45	9	35	28	57			37	92	16:45	142	554	145	622			287	1176
05:00	13		42				55		17:00	104		182				286	
05:15	12		19				31		17:15	131		162				293	
05:30	29		31				60		17:30	157		174				331	
05:45	29	83	62	154			91	237	17:45	156	548	177	695			333	1243
06:00	39		33				72		18:00	169		140				309	
06:15	41		59				100		18:15	161		158				319	
06:30	53		72				125		18:30	137		158				295	
06:45	58	191	66	230			124	421	18:45	185	652	140	596			325	1248
07:00	53		64				117		19:00	152		133				285	
07:15	46		66				112		19:15	150		143				293	
07:30	60		75				135		19:30	127		124				251	
07:45	67	226	65	270			132	496	19:45	142	571	102	502			244	1073
08:00	61		95				156		20:00	115		118				233	
08:15	56		84				140		20:15	137		88				225	
08:30	56		64				120		20:30	116		112				228	
08:45	82	255	95	338			177	593	20:45	102	470	60	378			162	848
09:00	70		106				176		21:00	122		72				194	
09:15	59		101				160		21:15	86		74				160	
09:30	65		102				167		21:30	81		53				134	
09:45	94	288	124	433			218	721	21:45	94	383	54	253			148	636
10:00	88		108				196		22:00	65		48				113	
10:15	83		133				216		22:15	54		52				106	
10:30	95		143				238		22:30	31		56				87	
10:45	94	360	122	506			216	866	22:45	43	193	34	190			77	383
11:00	102		136				238		23:00	37		34				71	
11:15	89		130				219		23:15	46		24				70	
11:30	128		120				248		23:30	38		24				62	
11:45	119	438	172	558			291	996	23:45	36	157	29	111			65	268
TOTALS		2069		2671				4740	TOTALS		5505		5569				11074
SPLIT %		43.6%		56.4%				30.0%	SPLIT %		49.7%		50.3%				70.0%

DAILY TOTALS	NB	SB	EB	WB	Total
	7,574	8,240	0	0	15,814

AM Peak Hour	11:45	11:45			11:45	PM Peak Hour	18:00	17:00			17:30
AM Pk Volume	515	633			1148	PM Pk Volume	652	695			1292
Pk Hr Factor	0.913	0.920			0.944	Pk Hr Factor	0.881	0.955			0.970
7 - 9 Volume	481	608	0	0	1089	4 - 6 Volume	1102	1317	0	0	2419
7 - 9 Peak Hour	08:00	08:00			08:00	4 - 6 Peak Hour	16:00	17:00			17:00
7 - 9 Pk Volume	255	338	0	0	593	4 - 6 Pk Volume	554	695	0	0	1243
Pk Hr Factor	0.777	0.889	0.000	0.000	0.838	Pk Hr Factor	0.949	0.955	0.000	0.000	0.933

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Mission Ave & Seagaze Dr

Day: Tuesday
Date: 8/6/2013

City: Oceanside
Project #: CA13_4290_003

DAILY TOTALS	NB	SB	EB	WB	Total
	8,442	8,046	0	0	16,488

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	33		14				47		12:00	157		145				302	
00:15	28		16				44		12:15	148		125				273	
00:30	14		14				28		12:30	143		128				271	
00:45	9	84	9	53			18	137	12:45	145	593	143	541			288	1134
01:00	4		7				11		13:00	149		157				306	
01:15	11		5				16		13:15	148		139				287	
01:30	10		13				23		13:30	142		123				265	
01:45	8	33	13	38			21	71	13:45	131	570	135	554			266	1124
02:00	3		8				11		14:00	141		142				283	
02:15	7		7				14		14:15	157		159				316	
02:30	5		4				9		14:30	146		161				307	
02:45	2	17	2	21			4	38	14:45	162	606	133	595			295	1201
03:00	6		7				13		15:00	144		152				296	
03:15	8		5				13		15:15	149		143				292	
03:30	4		6				10		15:30	148		157				305	
03:45	6	24	11	29			17	53	15:45	153	594	150	602			303	1196
04:00	3		14				17		16:00	155		141				296	
04:15	11		16				27		16:15	144		137				281	
04:30	14		22				36		16:30	143		163				306	
04:45	12	40	41	93			53	133	16:45	202	644	146	587			348	1231
05:00	22		51				73		17:00	187		130				317	
05:15	20		23				43		17:15	154		161				315	
05:30	23		61				84		17:30	199		135				334	
05:45	24	89	73	208			97	297	17:45	160	700	145	571			305	1271
06:00	33		45				78		18:00	194		139				333	
06:15	39		88				127		18:15	161		132				293	
06:30	43		84				127		18:30	193		126				319	
06:45	53	168	93	310			146	478	18:45	186	734	127	524			313	1258
07:00	47		81				128		19:00	212		142				354	
07:15	52		86				138		19:15	126		110				236	
07:30	92		71				163		19:30	136		97				233	
07:45	53	244	97	335			150	579	19:45	133	607	106	455			239	1062
08:00	62		77				139		20:00	160		106				266	
08:15	67		73				140		20:15	112		99				211	
08:30	60		81				141		20:30	91		60				151	
08:45	75	264	86	317			161	581	20:45	100	463	74	339			174	802
09:00	86		93				179		21:00	87		73				160	
09:15	79		107				186		21:15	90		70				160	
09:30	89		113				202		21:30	93		49				142	
09:45	108	362	119	432			227	794	21:45	67	337	55	247			122	584
10:00	94		115				209		22:00	53		44				97	
10:15	125		120				245		22:15	46		35				81	
10:30	125		115				240		22:30	49		29				78	
10:45	111	455	115	465			226	920	22:45	35	183	33	141			68	324
11:00	129		118				247		23:00	27		33				60	
11:15	120		113				233		23:15	32		25				57	
11:30	130		122				252		23:30	30		26				56	
11:45	140	519	125	478			265	997	23:45	23	112	27	111			50	223
TOTALS		2299		2779				5078	TOTALS		6143		5267				11410
SPLIT %		45.3%		54.7%				30.8%	SPLIT %		53.8%		46.2%				69.2%

DAILY TOTALS	NB	SB	EB	WB	Total
	8,442	8,046	0	0	16,488

AM Peak Hour	11:45	11:45			11:45	PM Peak Hour	18:15	14:15			16:45
AM Pk Volume	588	523			1111	PM Pk Volume	752	605			1314
Pk Hr Factor	0.936	0.902			0.920	Pk Hr Factor	0.887	0.939			0.944
7 - 9 Volume	508	652	0	0	1160	4 - 6 Volume	1344	1158	0	0	2502
7 - 9 Peak Hour	07:30	07:00			07:30	4 - 6 Peak Hour	16:45	16:30			16:45
7 - 9 Pk Volume	274	335	0	0	592	4 - 6 Pk Volume	742	600	0	0	1314
Pk Hr Factor	0.745	0.863	0.000	0.000	0.908	Pk Hr Factor	0.918	0.920	0.000	0.000	0.944

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Mission Ave & Seagaze Dr

Day: Wednesday
Date: 8/7/2013

City: Oceanside
Project #: CA13_4290_003

DAILY TOTALS	NB	SB	EB	WB	Total
	8,541	7,957	0	0	16,498

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	32		11				43		12:00	182		171				353	
00:15	28		20				48		12:15	146		143				289	
00:30	16		13				29		12:30	141		142				283	
00:45	6	82	12	56			18	138	12:45	164	633	136	592			300	1225
01:00	8		8				16		13:00	137		139				276	
01:15	5		5				10		13:15	145		123				268	
01:30	7		9				16		13:30	140		143				283	
01:45	6	26	15	37			21	63	13:45	141	563	129	534			270	1097
02:00	3		4				7		14:00	150		148				298	
02:15	5		7				12		14:15	161		131				292	
02:30	11		8				19		14:30	160		135				295	
02:45	3	22	2	21			5	43	14:45	146	617	132	546			278	1163
03:00	6		6				12		15:00	144		140				284	
03:15	4		5				9		15:15	158		141				299	
03:30	7		2				9		15:30	165		142				307	
03:45	10	27	10	23			20	50	15:45	148	615	130	553			278	1168
04:00	4		9				13		16:00	163		129				292	
04:15	9		12				21		16:15	161		145				306	
04:30	12		24				36		16:30	163		167				330	
04:45	13	38	41	86			54	124	16:45	185	672	147	588			332	1260
05:00	20		63				83		17:00	158		164				322	
05:15	17		26				43		17:15	149		143				292	
05:30	22		50				72		17:30	217		133				350	
05:45	32	91	83	222			115	313	17:45	171	695	154	594			325	1289
06:00	31		41				72		18:00	202		114				316	
06:15	41		76				117		18:15	165		136				301	
06:30	43		90				133		18:30	182		121				303	
06:45	57	172	84	291			141	463	18:45	177	726	125	496			302	1222
07:00	54		66				120		19:00	199		124				323	
07:15	52		80				132		19:15	126		117				243	
07:30	66		76				142		19:30	148		97				245	
07:45	79	251	75	297			154	548	19:45	158	631	95	433			253	1064
08:00	72		91				163		20:00	119		104				223	
08:15	82		94				176		20:15	125		89				214	
08:30	54		55				109		20:30	109		105				214	
08:45	63	271	98	338			161	609	20:45	105	458	57	355			162	813
09:00	78		106				184		21:00	100		67				167	
09:15	78		97				175		21:15	104		86				190	
09:30	93		89				182		21:30	75		51				126	
09:45	86	335	119	411			205	746	21:45	71	350	48	252			119	602
10:00	95		108				203		22:00	60		41				101	
10:15	101		110				211		22:15	52		37				89	
10:30	115		128				243		22:30	31		36				67	
10:45	126	437	118	464			244	901	22:45	34	177	23	137			57	314
11:00	141		123				264		23:00	31		35				66	
11:15	120		118				238		23:15	39		23				62	
11:30	115		134				249		23:30	29		29				58	
11:45	154	530	145	520			299	1050	23:45	23	122	24	111			47	233
TOTALS		2282		2766				5048	TOTALS		6259		5191				11450
SPLIT %		45.2%		54.8%				30.6%	SPLIT %		54.7%		45.3%				69.4%

DAILY TOTALS	NB	SB	EB	WB	Total
	8,541	7,957	0	0	16,498

AM Peak Hour	11:45	11:45			11:45	PM Peak Hour	17:30	16:15			16:45
AM Pk Volume	623	601			1224	PM Pk Volume	755	623			1296
Pk Hr Factor	0.856	0.879			0.867	Pk Hr Factor	0.870	0.933			0.926
7 - 9 Volume	522	635	0	0	1157	4 - 6 Volume	1367	1182	0	0	2549
7 - 9 Peak Hour	07:30	08:00			07:30	4 - 6 Peak Hour	16:45	16:15			16:45
7 - 9 Pk Volume	299	338	0	0	635	4 - 6 Pk Volume	709	623	0	0	1296
Pk Hr Factor	0.912	0.862	0.000	0.000	0.902	Pk Hr Factor	0.817	0.933	0.000	0.000	0.926

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Missour Ave & Washington Ave

Day: Tuesday
Date: 8/6/2013

City: Oceanside
Project #: CA13_4290_004

DAILY TOTALS	NB	SB	EB	WB	Total
	7,910	7,682	0	0	15,592

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	15		25				40		12:00	150		136				286	
00:15	26		13				39		12:15	168		126				294	
00:30	13		8				21		12:30	164		147				311	
00:45	9	63	10	56			19	119	12:45	134	616	141	550			275	1166
01:00	3		5				8		13:00	141		152				293	
01:15	11		3				14		13:15	153		140				293	
01:30	6		11				17		13:30	158		133				291	
01:45	9	29	14	33			23	62	13:45	145	597	135	560			280	1157
02:00	2		5				7		14:00	137		142				279	
02:15	6		3				9		14:15	141		167				308	
02:30	2		4				6		14:30	150		148				298	
02:45	3	13	4	16			7	29	14:45	152	580	145	602			297	1182
03:00	4		4				8		15:00	143		157				300	
03:15	6		5				11		15:15	154		140				294	
03:30	9		3				12		15:30	163		169				332	
03:45	4	23	7	19			11	42	15:45	64	524	136	602			200	1126
04:00	3		4				7		16:00	121		151				272	
04:15	9		2				11		16:15	163		131				294	
04:30	12		7				19		16:30	168		170				338	
04:45	18	42	7	20			25	62	16:45	164	616	173	625			337	1241
05:00	10		10				20		17:00	191		139				330	
05:15	13		6				19		17:15	160		164				324	
05:30	22		16				38		17:30	144		150				294	
05:45	29	74	21	53			50	127	17:45	168	663	143	596			311	1259
06:00	30		21				51		18:00	129		168				297	
06:15	41		25				66		18:15	171		126				297	
06:30	46		34				80		18:30	163		148				311	
06:45	49	166	50	130			99	296	18:45	141	604	132	574			273	1178
07:00	51		50				101		19:00	159		163				322	
07:15	58		53				111		19:15	123		123				246	
07:30	70		62				132		19:30	105		108				213	
07:45	56	235	85	250			141	485	19:45	111	498	101	495			212	993
08:00	69		90				159		20:00	119		98				217	
08:15	79		79				158		20:15	104		98				202	
08:30	56		59				115		20:30	71		65				136	
08:45	89	293	76	304			165	597	20:45	83	377	68	329			151	706
09:00	83		86				169		21:00	79		70				149	
09:15	82		95				177		21:15	76		87				163	
09:30	89		99				188		21:30	70		66				136	
09:45	126	380	111	391			237	771	21:45	60	285	59	282			119	567
10:00	91		104				195		22:00	36		49				85	
10:15	90		104				194		22:15	41		36				77	
10:30	120		123				243		22:30	39		32				71	
10:45	132	433	110	441			242	874	22:45	30	146	34	151			64	297
11:00	123		116				239		23:00	31		36				67	
11:15	137		113				250		23:15	28		29				57	
11:30	144		126				270		23:30	28		27				55	
11:45	146	550	134	489			280	1039	23:45	16	103	22	114			38	217
TOTALS		2301		2202				4503	TOTALS		5609		5480				11089
SPLIT %		51.1%		48.9%				28.9%	SPLIT %		50.6%		49.4%				71.1%

DAILY TOTALS	NB	SB	EB	WB	Total
	7,910	7,682	0	0	15,592

AM Peak Hour	11:45	11:45			11:45	PM Peak Hour	16:15	16:30			16:30
AM Pk Volume	628	543			1171	PM Pk Volume	686	646			1329
Pk Hr Factor	0.935	0.923			0.941	Pk Hr Factor	0.898	0.934			0.983
7 - 9 Volume	528	554	0	0	1082	4 - 6 Volume	1279	1221	0	0	2500
7 - 9 Peak Hour	08:00	07:30			08:00	4 - 6 Peak Hour	16:15	16:30			16:30
7 - 9 Pk Volume	293	316	0	0	597	4 - 6 Pk Volume	686	646	0	0	1329
Pk Hr Factor	0.823	0.878	0.000	0.000	0.905	Pk Hr Factor	0.898	0.934	0.000	0.000	0.983

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Missour Ave & Washington Ave

Day: Wednesday
Date: 8/7/2013

City: Oceanside
Project #: CA13_4290_004

DAILY TOTALS	NB	SB	EB	WB	Total
	8,240	7,658	0	0	15,898

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	19		20				39		12:00	170		180				350	
00:15	13		28				41		12:15	142		133				275	
00:30	10		17				27		12:30	133		145				278	
00:45	5	47	16	81			21	128	12:45	179	624	133	591			312	1215
01:00	11		13				24		13:00	124		121				245	
01:15	5		5				10		13:15	151		144				295	
01:30	7		8				15		13:30	151		127				278	
01:45	5	28	6	32			11	60	13:45	145	571	126	518			271	1089
02:00	3		4				7		14:00	154		146				300	
02:15	4		4				8		14:15	172		141				313	
02:30	8		8				16		14:30	139		145				284	
02:45	1	16	0	16			1	32	14:45	159	624	136	568			295	1192
03:00	2		4				6		15:00	158		152				310	
03:15	5		4				9		15:15	154		143				297	
03:30	6		3				9		15:30	155		160				315	
03:45	10	23	2	13			12	36	15:45	154	621	130	585			284	1206
04:00	3		3				6		16:00	174		134				308	
04:15	11		4				15		16:15	162		130				292	
04:30	6		8				14		16:30	192		162				354	
04:45	14	34	13	28			27	62	16:45	165	693	196	622			361	1315
05:00	11		13				24		17:00	153		171				324	
05:15	17		9				26		17:15	157		157				314	
05:30	22		14				36		17:30	155		154				309	
05:45	25	75	21	57			46	132	17:45	194	659	157	639			351	1298
06:00	35		19				54		18:00	167		157				324	
06:15	48		31				79		18:15	168		132				300	
06:30	43		48				91		18:30	158		128				286	
06:45	60	186	55	153			115	339	18:45	160	653	143	560			303	1213
07:00	57		49				106		19:00	145		134				279	
07:15	57		59				116		19:15	128		110				238	
07:30	60		66				126		19:30	125		95				220	
07:45	72	246	67	241			139	487	19:45	128	526	109	448			237	974
08:00	63		82				145		20:00	118		108				226	
08:15	78		91				169		20:15	122		94				216	
08:30	69		50				119		20:30	87		100				187	
08:45	78	288	81	304			159	592	20:45	96	423	77	379			173	802
09:00	80		90				170		21:00	86		72				158	
09:15	78		92				170		21:15	74		97				171	
09:30	93		92				185		21:30	66		60				126	
09:45	94	345	103	377			197	722	21:45	60	286	68	297			128	583
10:00	94		94				188		22:00	51		40				91	
10:15	108		105				213		22:15	56		31				87	
10:30	118		114				232		22:30	37		26				63	
10:45	127	447	102	415			229	862	22:45	31	175	26	123			57	298
11:00	147		108				255		23:00	25		32				57	
11:15	115		123				238		23:15	25		27				52	
11:30	131		123				254		23:30	26		17				43	
11:45	159	552	150	504			309	1056	23:45	22	98	31	107			53	205
TOTALS		2287		2221				4508	TOTALS		5953		5437				11390
SPLIT %		50.7%		49.3%				28.4%	SPLIT %		52.3%		47.7%				71.6%

DAILY TOTALS	NB	SB	EB	WB	Total
	8,240	7,658	0	0	15,898

AM Peak Hour	11:45	11:45				11:45	PM Peak Hour	16:00	16:30				16:30
AM Pk Volume	604	608				1212	PM Pk Volume	693	686				1353
Pk Hr Factor	0.888	0.844				0.866	Pk Hr Factor	0.902	0.875				0.937
7 - 9 Volume	534	545	0	0		1079	4 - 6 Volume	1352	1261	0	0		2613
7 - 9 Peak Hour	08:00	07:30				08:00	4 - 6 Peak Hour	16:00	16:30				16:30
7 - 9 Pk Volume	288	306	0	0		592	4 - 6 Pk Volume	693	686	0	0		1353
Pk Hr Factor	0.923	0.841	0.000	0.000		0.876	Pk Hr Factor	0.902	0.875	0.000	0.000		0.937

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Stanley St & Eucalyptus St

Day: Tuesday
Date: 8/6/2013

City: Oceanside
Project #: CA13_4290_005

DAILY TOTALS	NB	SB	EB	WB	Total
	9,206	9,264	0	0	18,470

AM Period	NB		SB		EB		WB		TOTAL	
00:00	13		21						34	
00:15	21		16						37	
00:30	19		10						29	
00:45	6	59	10	57					16	116
01:00	2		4						6	
01:15	11		10						21	
01:30	10		14						24	
01:45	9	32	15	43					24	75
02:00	3		5						8	
02:15	8		4						12	
02:30	2		7						9	
02:45	2	15	3	19					5	34
03:00	2		1						3	
03:15	7		5						12	
03:30	10		5						15	
03:45	4	23	6	17					10	40
04:00	4		7						11	
04:15	9		6						15	
04:30	9		7						16	
04:45	13	35	7	27					20	62
05:00	12		9						21	
05:15	16		18						34	
05:30	24		16						40	
05:45	22	74	26	69					48	143
06:00	31		34						65	
06:15	45		34						79	
06:30	42		55						97	
06:45	55	173	67	190					122	363
07:00	61		71						132	
07:15	62		69						131	
07:30	64		82						146	
07:45	65	252	99	321					164	573
08:00	78		107						185	
08:15	75		110						185	
08:30	77		97						174	
08:45	98	328	100	414					198	742
09:00	103		106						209	
09:15	110		119						229	
09:30	116		123						239	
09:45	131	460	137	485					268	945
10:00	113		121						234	
10:15	145		144						289	
10:30	138		168						306	
10:45	155	551	153	586					308	1137
11:00	144		143						287	
11:15	149		151						300	
11:30	169		139						308	
11:45	195	657	167	600					362	1257
TOTALS		2659		2828						**5487**
SPLIT %		48.5%		51.5%						**29.7%**

PM Period	NB		SB		EB		WB		TOTAL	
12:00	160		162						322	
12:15	173		161						334	
12:30	181		180						361	
12:45	152	666	154	657					306	1323
13:00	177		184						361	
13:15	164		171						335	
13:30	184		160						344	
13:45	172	697	171	686					343	1383
14:00	171		179						350	
14:15	168		177						345	
14:30	155		176						331	
14:45	170	664	175	707					345	1371
15:00	158		179						337	
15:15	183		182						365	
15:30	169		198						367	
15:45	174	684	164	723					338	1407
16:00	188		179						367	
16:15	191		162						353	
16:30	182		180						362	
16:45	192	753	200	721					392	1474
17:00	208		169						377	
17:15	198		172						370	
17:30	198		176						374	
17:45	169	773	157	674					326	1447
18:00	173		178						351	
18:15	198		151						349	
18:30	175		188						363	
18:45	174	720	158	675					332	1395
19:00	172		153						325	
19:15	131		144						275	
19:30	122		139						261	
19:45	135	560	125	561					260	1121
20:00	133		129						262	
20:15	105		125						230	
20:30	89		82						171	
20:45	87	414	80	416					167	830
21:00	69		80						149	
21:15	107		93						200	
21:30	71		82						153	
21:45	65	312	68	323					133	635
22:00	51		47						98	
22:15	54		48						102	
22:30	45		41						86	
22:45	40	190	37	173					77	363
23:00	31		39						70	
23:15	33		26						59	
23:30	32		33						65	
23:45	18	114	22	120					40	234
TOTALS		6547		6436						**12983**
SPLIT %		50.4%		49.6%						**70.3%**

DAILY TOTALS	NB	SB	EB	WB	Total
	9,206	9,264	0	0	18,470

AM Peak Hour	11:45	11:45			**11:45**
AM Pk Volume	709	670			**1379**
Pk Hr Factor	0.909	0.931			**0.952**
7 - 9 Volume	580	735	0	0	**1315**
7 - 9 Peak Hour	08:00	08:00			**08:00**
7 - 9 Pk Volume	328	414	0	0	**742**
Pk Hr Factor	0.837	0.941	0.000	0.000	**0.937**

PM Peak Hour	16:45	14:45			**16:45**
PM Pk Volume	796	734			**1513**
Pk Hr Factor	0.957	0.927			**0.965**
4 - 6 Volume	1526	1395	0	0	**2921**
4 - 6 Peak Hour	16:45	16:00			**16:45**
4 - 6 Pk Volume	796	721	0	0	**1513**
Pk Hr Factor	0.957	0.901	0.000	0.000	**0.965**

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Stanley St & Eucalyptus St

Day: Wednesday
Date: 8/7/2013

City: Oceanside
Project #: CA13_4290_005

DAILY TOTALS	NB	SB	EB	WB	Total
	9,554	9,122	0	0	18,676

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	22		25				47		12:00	187		212				399	
00:15	16		32				48		12:15	163		170				333	
00:30	9		18				27		12:30	155		177				332	
00:45	5	52	14	89			19	141	12:45	194	699	147	706			341	1405
01:00	15		15				30		13:00	156		163				319	
01:15	7		6				13		13:15	159		172				331	
01:30	10		10				20		13:30	188		177				365	
01:45	6	38	6	37			12	75	13:45	181	684	158	670			339	1354
02:00	2		9				11		14:00	175		173				348	
02:15	8		3				11		14:15	180		182				362	
02:30	6		11				17		14:30	178		163				341	
02:45	2	18	0	23			2	41	14:45	166	699	177	695			343	1394
03:00	1		2				3		15:00	177		164				341	
03:15	7		5				12		15:15	183		192				375	
03:30	5		5				10		15:30	191		177				368	
03:45	7	20	2	14			9	34	15:45	181	732	183	716			364	1448
04:00	3		7				10		16:00	193		162				355	
04:15	10		3				13		16:15	196		175				371	
04:30	6		7				13		16:30	228		186				414	
04:45	12	31	12	29			24	60	16:45	189	806	221	744			410	1550
05:00	19		16				35		17:00	188		188				376	
05:15	20		19				39		17:15	201		174				375	
05:30	21		22				43		17:30	226		165				391	
05:45	20	80	30	87			50	167	17:45	219	834	167	694			386	1528
06:00	34		21				55		18:00	190		188				378	
06:15	51		43				94		18:15	206		168				374	
06:30	45		65				110		18:30	181		152				333	
06:45	66	196	79	208			145	404	18:45	199	776	159	667			358	1443
07:00	61		64				125		19:00	171		134				305	
07:15	65		82				147		19:15	140		125				265	
07:30	53		87				140		19:30	143		118				261	
07:45	88	267	79	312			167	579	19:45	144	598	134	511			278	1109
08:00	75		98				173		20:00	138		110				248	
08:15	100		105				205		20:15	136		97				233	
08:30	81		84				165		20:30	94		115				209	
08:45	98	354	91	378			189	732	20:45	105	473	81	403			186	876
09:00	92		112				204		21:00	90		89				179	
09:15	95		106				201		21:15	81		101				182	
09:30	103		119				222		21:30	64		66				130	
09:45	123	413	115	452			238	865	21:45	61	296	80	336			141	632
10:00	124		101				225		22:00	56		45				101	
10:15	118		123				241		22:15	60		29				89	
10:30	143		149				292		22:30	45		34				79	
10:45	158	543	121	494			279	1037	22:45	34	195	29	137			63	332
11:00	152		142				294		23:00	27		39				66	
11:15	155		127				282		23:15	32		30				62	
11:30	144		159				303		23:30	28		23				51	
11:45	187	638	171	599			358	1237	23:45	25	112	29	121			54	233
TOTALS		2650		2722				5372	TOTALS		6904		6400				13304
SPLIT %		49.3%		50.7%				28.8%	SPLIT %		51.9%		48.1%				71.2%

DAILY TOTALS	NB	SB	EB	WB	Total
	9,554	9,122	0	0	18,676

AM Peak Hour	11:45	11:45			11:45	PM Peak Hour	17:30	16:15			16:30
AM Pk Volume	692	730			1422	PM Pk Volume	841	770			1575
Pk Hr Factor	0.925	0.861			0.891	Pk Hr Factor	0.930	0.871			0.951
7 - 9 Volume	621	690	0	0	1311	4 - 6 Volume	1640	1438	0	0	3078
7 - 9 Peak Hour	08:00	08:00			08:00	4 - 6 Peak Hour	17:00	16:15			16:30
7 - 9 Pk Volume	354	378	0	0	732	4 - 6 Pk Volume	834	770	0	0	1575
Pk Hr Factor	0.885	0.900	0.000	0.000	0.893	Pk Hr Factor	0.923	0.871	0.000	0.000	0.951

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Sprinter RR Tracks & Morse St

Day: Tuesday
Date: 8/6/2013

City: Oceanside
Project #: CA13_4290_006

DAILY TOTALS	NB	SB	EB	WB	Total
	9,429	9,670	0	0	19,099

AM Period	NB		SB		EB	WB	TOTAL	
00:00	11		18				29	
00:15	14		21				35	
00:30	14		11				25	
00:45	7	46	12	62			19	108
01:00	8		10				18	
01:15	10		3				13	
01:30	9		10				19	
01:45	7	34	16	39			23	73
02:00	5		7				12	
02:15	8		5				13	
02:30	2		4				6	
02:45	4	19	3	19			7	38
03:00	4		1				5	
03:15	9		6				15	
03:30	5		5				10	
03:45	7	25	7	19			14	44
04:00	8		3				11	
04:15	7		4				11	
04:30	2		9				11	
04:45	10	27	16	32			26	59
05:00	12		14				26	
05:15	12		20				32	
05:30	19		17				36	
05:45	18	61	25	76			43	137
06:00	27		47				74	
06:15	34		44				78	
06:30	45		72				117	
06:45	52	158	63	226			115	384
07:00	49		77				126	
07:15	67		82				149	
07:30	57		118				175	
07:45	68	241	125	402			193	643
08:00	68		105				173	
08:15	91		116				207	
08:30	93		116				209	
08:45	118	370	112	449			230	819
09:00	99		95				194	
09:15	113		129				242	
09:30	132		144				276	
09:45	127	471	130	498			257	969
10:00	111		118				229	
10:15	135		136				271	
10:30	149		173				322	
10:45	164	559	165	592			329	1151
11:00	161		149				310	
11:15	173		158				331	
11:30	171		168				339	
11:45	185	690	176	651			361	1341
TOTALS		2701		3065				5766
SPLIT %		46.8%		53.2%				30.2%

PM Period	NB		SB		EB	WB	TOTAL	
12:00	176		179				355	
12:15	175		147				322	
12:30	170		180				350	
12:45	171	692	173	679			344	1371
13:00	182		185				367	
13:15	193		190				383	
13:30	187		171				358	
13:45	169	731	175	721			344	1452
14:00	175		202				377	
14:15	167		169				336	
14:30	167		168				335	
14:45	190	699	167	706			357	1405
15:00	176		172				348	
15:15	187		195				382	
15:30	191		219				410	
15:45	197	751	186	772			383	1523
16:00	205		186				391	
16:15	198		196				394	
16:30	190		173				363	
16:45	179	772	213	768			392	1540
17:00	205		190				395	
17:15	182		174				356	
17:30	223		190				413	
17:45	203	813	176	730			379	1543
18:00	174		192				366	
18:15	176		163				339	
18:30	176		180				356	
18:45	149	675	142	677			291	1352
19:00	169		147				316	
19:15	152		170				322	
19:30	138		123				261	
19:45	133	592	136	576			269	1168
20:00	122		133				255	
20:15	113		110				223	
20:30	92		75				167	
20:45	78	405	76	394			154	799
21:00	86		69				155	
21:15	94		96				190	
21:30	81		71				152	
21:45	57	318	56	292			113	610
22:00	47		48				95	
22:15	43		42				85	
22:30	48		40				88	
22:45	34	172	39	169			73	341
23:00	29		38				67	
23:15	34		30				64	
23:30	25		26				51	
23:45	20	108	27	121			47	229
TOTALS		6728		6605				13333
SPLIT %		50.5%		49.5%				69.8%

DAILY TOTALS	NB	SB	EB	WB	Total
	9,429	9,670	0	0	19,099

AM Peak Hour	11:30	11:45			11:45
AM Pk Volume	707	682			1388
Pk Hr Factor	0.955	0.947			0.961
7 - 9 Volume	611	851	0	0	1462
7 - 9 Peak Hour	08:00	07:30			08:00
7 - 9 Pk Volume	370	464	0	0	819
Pk Hr Factor	0.784	0.928	0.000	0.000	0.890

PM Peak Hour	17:00	15:30			15:30
PM Pk Volume	813	787			1578
Pk Hr Factor	0.911	0.898			0.962
4 - 6 Volume	1585	1498	0	0	3083
4 - 6 Peak Hour	17:00	16:15			16:45
4 - 6 Pk Volume	813	772	0	0	1556
Pk Hr Factor	0.911	0.906	0.000	0.000	0.942

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Sprinter RR Tracks & Morse St

Day: Wednesday
Date: 8/7/2013

City: Oceanside
Project #: CA13_4290_006

DAILY TOTALS	NB	SB	EB	WB	Total
	9,492	9,512	0	0	19,004

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	17		29				46		12:00	152		211				363	
00:15	10		23				33		12:15	155		185				340	
00:30	7		20				27		12:30	162		175				337	
00:45	3	37	17	89			20	126	12:45	168	637	164	735			332	1372
01:00	11		9				20		13:00	168		169				337	
01:15	11		7				18		13:15	168		163				331	
01:30	9		12				21		13:30	174		168				342	
01:45	1	32	9	37			10	69	13:45	155	665	162	662			317	1327
02:00	2		4				6		14:00	172		180				352	
02:15	2		4				6		14:15	188		176				364	
02:30	5		11				16		14:30	170		167				337	
02:45	2	11	1	20			3	31	14:45	163	693	167	690			330	1383
03:00	4		3				7		15:00	181		194				375	
03:15	6		6				12		15:15	202		180				382	
03:30	5		4				9		15:30	179		168				347	
03:45	6	21	2	15			8	36	15:45	176	738	184	726			360	1464
04:00	3		6				9		16:00	214		190				404	
04:15	3		6				9		16:15	196		185				381	
04:30	4		13				17		16:30	226		181				407	
04:45	10	20	12	37			22	57	16:45	226	862	207	763			433	1625
05:00	15		17				32		17:00	199		185				384	
05:15	18		21				39		17:15	215		184				399	
05:30	22		26				48		17:30	207		209				416	
05:45	21	76	31	95			52	171	17:45	250	871	184	762			434	1633
06:00	31		36				67		18:00	202		194				396	
06:15	44		46				90		18:15	214		169				383	
06:30	48		58				106		18:30	184		163				347	
06:45	57	180	87	227			144	407	18:45	174	774	157	683			331	1457
07:00	57		77				134		19:00	170		139				309	
07:15	68		92				160		19:15	160		120				280	
07:30	50		99				149		19:30	167		126				293	
07:45	80	255	105	373			185	628	19:45	142	639	120	505			262	1144
08:00	84		93				177		20:00	134		118				252	
08:15	107		102				209		20:15	131		89				220	
08:30	94		109				203		20:30	86		102				188	
08:45	85	370	99	403			184	773	20:45	96	447	77	386			173	833
09:00	100		115				215		21:00	92		83				175	
09:15	106		106				212		21:15	88		110				198	
09:30	106		145				251		21:30	68		71				139	
09:45	125	437	142	508			267	945	21:45	57	305	93	357			150	662
10:00	123		127				250		22:00	47		48				95	
10:15	114		132				246		22:15	56		29				85	
10:30	126		139				265		22:30	47		32				79	
10:45	147	510	159	557			306	1067	22:45	38	188	30	139			68	327
11:00	168		150				318		23:00	23		39				62	
11:15	145		146				291		23:15	25		26				51	
11:30	147		168				315		23:30	23		19				42	
11:45	170	630	172	636			342	1266	23:45	23	94	23	107			46	201
TOTALS		2579		2997				5576	TOTALS		6913		6515				13428
SPLIT %		46.3%		53.7%				29.3%	SPLIT %		51.5%		48.5%				70.7%

DAILY TOTALS	NB	SB	EB	WB	Total
	9,492	9,512	0	0	19,004

AM Peak Hour	11:45	11:45			11:45	PM Peak Hour	17:15	16:45			17:15
AM Pk Volume	639	743			1382	PM Pk Volume	874	785			1645
Pk Hr Factor	0.940	0.880			0.952	Pk Hr Factor	0.874	0.939			0.948
7 - 9 Volume	625	776	0	0	1401	4 - 6 Volume	1733	1525	0	0	3258
7 - 9 Peak Hour	08:00	07:45			07:45	4 - 6 Peak Hour	17:00	16:45			17:00
7 - 9 Pk Volume	370	409	0	0	774	4 - 6 Pk Volume	871	785	0	0	1633
Pk Hr Factor	0.864	0.938	0.000	0.000	0.926	Pk Hr Factor	0.871	0.939	0.000	0.000	0.941

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Whaley St & Cassidy St

Day: Tuesday
Date: 8/6/2013

City: Oceanside
Project #: CA13_4290_007

DAILY TOTALS	NB	SB	EB	WB	Total
	8,185	8,733	0	0	16,918

AM Period	NB		SB		EB		WB		TOTAL		PM Period	NB		SB		EB		WB		TOTAL	
00:00	14		15						29		12:00	149		159						308	
00:15	11		23						34		12:15	159		144						303	
00:30	15		13						28		12:30	153		156						309	
00:45	7	47	13	64					20	111	12:45	142	603	148	607					290	1210
01:00	4		8						12		13:00	168		162						330	
01:15	8		4						12		13:15	178		172						350	
01:30	11		7						18		13:30	154		174						328	
01:45	5	28	17	36					22	64	13:45	155	655	168	676					323	1331
02:00	5		8						13		14:00	164		194						358	
02:15	8		3						11		14:15	135		171						306	
02:30	2		3						5		14:30	159		144						303	
02:45	1	16	2	16					3	32	14:45	157	615	139	648					296	1263
03:00	4		1						5		15:00	153		154						307	
03:15	9		4						13		15:15	177		165						342	
03:30	3		4						7		15:30	166		188						354	
03:45	4	20	5	14					9	34	15:45	147	643	163	670					310	1313
04:00	7		3						10		16:00	176		172						348	
04:15	6		4						10		16:15	170		165						335	
04:30	3		8						11		16:30	161		166						327	
04:45	8	24	16	31					24	55	16:45	160	667	185	688					345	1355
05:00	7		16						23		17:00	186		184						370	
05:15	7		25						32		17:15	152		142						294	
05:30	16		18						34		17:30	174		165						339	
05:45	19	49	33	92					52	141	17:45	178	690	163	654					341	1344
06:00	24		45						69		18:00	155		153						308	
06:15	24		46						70		18:15	164		156						320	
06:30	47		71						118		18:30	138		165						303	
06:45	43	138	60	222					103	360	18:45	133	590	117	591					250	1181
07:00	38		75						113		19:00	118		125						243	
07:15	56		86						142		19:15	140		149						289	
07:30	55		103						158		19:30	116		102						218	
07:45	61	210	108	372					169	582	19:45	128	502	134	510					262	1012
08:00	66		105						171		20:00	105		108						213	
08:15	74		99						173		20:15	98		88						186	
08:30	80		107						187		20:30	76		75						151	
08:45	104	324	103	414					207	738	20:45	70	349	67	338					137	687
09:00	94		93						187		21:00	68		60						128	
09:15	108		110						218		21:15	82		89						171	
09:30	97		126						223		21:30	69		62						131	
09:45	108	407	128	457					236	864	21:45	49	268	49	260					98	528
10:00	89		103						192		22:00	48		44						92	
10:15	119		124						243		22:15	28		40						68	
10:30	137		136						273		22:30	44		35						79	
10:45	140	485	175	538					315	1023	22:45	27	147	40	159					67	306
11:00	141		122						263		23:00	30		37						67	
11:15	148		148						296		23:15	29		21						50	
11:30	161		144						305		23:30	21		21						42	
11:45	161	611	163	577					324	1188	23:45	17	97	20	99					37	196
TOTALS		2359		2833						5192	TOTALS		5826		5900						11726
SPLIT %		45.4%		54.6%						30.7%	SPLIT %		49.7%		50.3%						69.3%

DAILY TOTALS	NB	SB	EB	WB	Total
	8,185	8,733	0	0	16,918

AM Peak Hour	11:30	11:45			11:45	PM Peak Hour	17:00	13:15			16:15
AM Pk Volume	630	622			1244	PM Pk Volume	690	708			1377
Pk Hr Factor	0.978	0.954			0.960	Pk Hr Factor	0.927	0.912			0.930
7 - 9 Volume	534	786	0	0	1320	4 - 6 Volume	1357	1342	0	0	2699
7 - 9 Peak Hour	08:00	07:45			08:00	4 - 6 Peak Hour	17:00	16:15			16:15
7 - 9 Pk Volume	324	419	0	0	738	4 - 6 Pk Volume	690	700	0	0	1377
Pk Hr Factor	0.779	0.970	0.000	0.000	0.891	Pk Hr Factor	0.927	0.946	0.000	0.000	0.930

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Whaley St & Cassidy St

Day: Wednesday
Date: 8/7/2013

City: Oceanside
Project #: CA13_4290_007

DAILY TOTALS	NB	SB	EB	WB	Total
	8,465	8,438	0	0	16,903

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	16		24				40		12:00	136		181				317	
00:15	9		23				32		12:15	150		137				287	
00:30	8		18				26		12:30	142		150				292	
00:45	6	39	13	78			19	117	12:45	147	575	156	624			303	1199
01:00	9		12				21		13:00	171		161				332	
01:15	10		5				15		13:15	152		157				309	
01:30	7		12				19		13:30	142		157				299	
01:45	1	27	10	39			11	66	13:45	157	622	141	616			298	1238
02:00	1		4				5		14:00	160		161				321	
02:15	2		4				6		14:15	169		179				348	
02:30	5		10				15		14:30	156		138				294	
02:45	2	10	1	19			3	29	14:45	167	652	157	635			324	1287
03:00	5		4				9		15:00	163		134				297	
03:15	1		3				4		15:15	184		144				328	
03:30	5		6				11		15:30	166		137				303	
03:45	5	16	3	16			8	32	15:45	154	667	158	573			312	1240
04:00	4		5				9		16:00	199		176				375	
04:15	2		6				8		16:15	175		159				334	
04:30	4		12				16		16:30	188		163				351	
04:45	7	17	11	34			18	51	16:45	196	758	169	667			365	1425
05:00	9		22				31		17:00	188		177				365	
05:15	17		20				37		17:15	191		155				346	
05:30	14		31				45		17:30	195		164				359	
05:45	19	59	31	104			50	163	17:45	215	789	178	674			393	1463
06:00	28		39				67		18:00	182		162				344	
06:15	33		48				81		18:15	168		151				319	
06:30	46		59				105		18:30	163		139				302	
06:45	49	156	84	230			133	386	18:45	162	675	141	593			303	1268
07:00	42		76				118		19:00	149		110				259	
07:15	62		99				161		19:15	138		102				240	
07:30	58		92				150		19:30	144		106				250	
07:45	71	233	90	357			161	590	19:45	128	559	112	430			240	989
08:00	76		79				155		20:00	113		104				217	
08:15	91		84				175		20:15	106		84				190	
08:30	70		99				169		20:30	72		92				164	
08:45	71	308	77	339			148	647	20:45	84	375	60	340			144	715
09:00	90		91				181		21:00	90		74				164	
09:15	99		94				193		21:15	73		94				167	
09:30	91		119				210		21:30	57		60				117	
09:45	118	398	118	422			236	820	21:45	51	271	81	309			132	580
10:00	100		112				212		22:00	39		49				88	
10:15	111		122				233		22:15	52		28				80	
10:30	111		121				232		22:30	36		27				63	
10:45	145	467	139	494			284	961	22:45	34	161	25	129			59	290
11:00	144		159				303		23:00	21		34				55	
11:15	137		136				273		23:15	21		27				48	
11:30	122		152				274		23:30	18		17				35	
11:45	147	550	170	617			317	1167	23:45	21	81	21	99			42	180
TOTALS		2280		2749				5029	TOTALS		6185		5689				11874
SPLIT %		45.3%		54.7%				29.8%	SPLIT %		52.1%		47.9%				70.2%

DAILY TOTALS	NB	SB	EB	WB	Total
	8,465	8,438	0	0	16,903

AM Peak Hour	11:45	11:30			11:45	PM Peak Hour	17:00	17:00			17:00
AM Pk Volume	575	640			1213	PM Pk Volume	789	674			1463
Pk Hr Factor	0.958	0.884			0.957	Pk Hr Factor	0.917	0.947			0.931
7 - 9 Volume	541	696	0	0	1237	4 - 6 Volume	1547	1341	0	0	2888
7 - 9 Peak Hour	07:45	07:15			07:45	4 - 6 Peak Hour	17:00	17:00			17:00
7 - 9 Pk Volume	308	360	0	0	660	4 - 6 Pk Volume	789	674	0	0	1463
Pk Hr Factor	0.846	0.909	0.000	0.000	0.943	Pk Hr Factor	0.917	0.947	0.000	0.000	0.931

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Kelly St & Vista Way

Day: Tuesday
Date: 8/6/2013

City: Oceanside
Project #: CA13_4290_008

DAILY TOTALS	NB	SB	EB	WB	Total
	9,510	8,906	0	0	18,416

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	14		11				25		12:00	183		162				345	
00:15	14		24				38		12:15	193		145				338	
00:30	12		17				29		12:30	196		180				376	
00:45	7	47	12	64			19	111	12:45	127	699	146	633			273	1332
01:00	8		10				18		13:00	203		165				368	
01:15	8		4				12		13:15	192		184				376	
01:30	9		10				19		13:30	181		175				356	
01:45	7	32	15	39			22	71	13:45	171	747	176	700			347	1447
02:00	8		8				16		14:00	189		200				389	
02:15	8		5				13		14:15	144		166				310	
02:30	6		4				10		14:30	172		165				337	
02:45	3	25	2	19			5	44	14:45	184	689	156	687			340	1376
03:00	6		3				9		15:00	189		176				365	
03:15	9		2				11		15:15	183		159				342	
03:30	3		2				5		15:30	176		188				364	
03:45	1	19	7	14			8	33	15:45	186	734	159	682			345	1416
04:00	9		2				11		16:00	191		162				353	
04:15	5		5				10		16:15	201		163				364	
04:30	6		10				16		16:30	221		172				393	
04:45	8	28	15	32			23	60	16:45	219	832	166	663			385	1495
05:00	5		17				22		17:00	235		187				422	
05:15	9		27				36		17:15	193		162				355	
05:30	15		26				41		17:30	236		156				392	
05:45	21	50	36	106			57	156	17:45	208	872	149	654			357	1526
06:00	27		44				71		18:00	194		154				348	
06:15	30		50				80		18:15	189		147				336	
06:30	52		69				121		18:30	155		172				327	
06:45	50	159	65	228			115	387	18:45	149	687	120	593			269	1280
07:00	60		78				138		19:00	175		122				297	
07:15	58		88				146		19:15	151		146				297	
07:30	72		107				179		19:30	123		80				203	
07:45	81	271	102	375			183	646	19:45	130	579	121	469			251	1048
08:00	94		104				198		20:00	110		119				229	
08:15	83		107				190		20:15	108		94				202	
08:30	96		108				204		20:30	85		78				163	
08:45	115	388	107	426			222	814	20:45	74	377	76	367			150	744
09:00	106		99				205		21:00	66		60				126	
09:15	119		119				238		21:15	75		89				164	
09:30	120		128				248		21:30	64		65				129	
09:45	136	481	128	474			264	955	21:45	53	258	50	264			103	522
10:00	121		116				237		22:00	50		45				95	
10:15	125		144				269		22:15	38		42				80	
10:30	179		138				317		22:30	42		45				87	
10:45	161	586	145	543			306	1129	22:45	28	158	36	168			64	326
11:00	177		140				317		23:00	36		29				65	
11:15	161		146				307		23:15	26		28				54	
11:30	181		166				347		23:30	20		20				40	
11:45	167	686	150	602			317	1288	23:45	24	106	27	104			51	210
TOTALS		2772		2922				5694	TOTALS		6738		5984				12722
SPLIT %		48.7%		51.3%				30.9%	SPLIT %		53.0%		47.0%				69.1%

DAILY TOTALS	NB	SB	EB	WB	Total
	9,510	8,906	0	0	18,416

AM Peak Hour	11:45	11:45			11:45	PM Peak Hour	16:45	13:15			16:15
AM Pk Volume	739	637			1376	PM Pk Volume	883	735			1564
Pk Hr Factor	0.943	0.885			0.915	Pk Hr Factor	0.935	0.919			0.927
7 - 9 Volume	659	801	0	0	1460	4 - 6 Volume	1704	1317	0	0	3021
7 - 9 Peak Hour	08:00	08:00			08:00	4 - 6 Peak Hour	16:45	16:15			16:15
7 - 9 Pk Volume	388	426	0	0	814	4 - 6 Pk Volume	883	688	0	0	1564
Pk Hr Factor	0.843	0.986	0.000	0.000	0.917	Pk Hr Factor	0.935	0.920	0.000	0.000	0.927

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Kelly St & Vista Way

Day: Wednesday
Date: 8/7/2013

City: Oceanside
Project #: CA13_4290_008

DAILY TOTALS	NB	SB	EB	WB	Total
	9,540	8,768	0	0	18,308

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	17		19				36		12:00	134		178				312	
00:15	10		25				35		12:15	174		148				322	
00:30	11		19				30		12:30	170		176				346	
00:45	10	48	18	81			28	129	12:45	176	654	150	652			326	1306
01:00	9		14				23		13:00	205		166				371	
01:15	9		4				13		13:15	164		165				329	
01:30	10		10				20		13:30	173		178				351	
01:45	5	33	13	41			18	74	13:45	173	715	149	658			322	1373
02:00	2		5				7		14:00	192		171				363	
02:15	5		4				9		14:15	182		185				367	
02:30	6		10				16		14:30	159		159				318	
02:45	3	16	5	24			8	40	14:45	175	708	173	688			348	1396
03:00	4		2				6		15:00	197		171				368	
03:15	4		4				8		15:15	195		160				355	
03:30	5		5				10		15:30	183		175				358	
03:45	4	17	1	12			5	29	15:45	183	758	157	663			340	1421
04:00	4		6				10		16:00	223		155				378	
04:15	4		10				14		16:15	204		152				356	
04:30	6		11				17		16:30	187		156				343	
04:45	8	22	12	39			20	61	16:45	230	844	171	634			401	1478
05:00	10		21				31		17:00	201		194				395	
05:15	14		19				33		17:15	244		160				404	
05:30	16		33				49		17:30	215		172				387	
05:45	18	58	36	109			54	167	17:45	249	909	156	682			405	1591
06:00	30		49				79		18:00	215		166				381	
06:15	45		57				102		18:15	193		146				339	
06:30	56		66				122		18:30	177		136				313	
06:45	63	194	91	263			154	457	18:45	177	762	129	577			306	1339
07:00	46		81				127		19:00	162		117				279	
07:15	65		106				171		19:15	153		114				267	
07:30	68		119				187		19:30	152		102				254	
07:45	88	267	85	391			173	658	19:45	135	602	105	438			240	1040
08:00	95		83				178		20:00	124		100				224	
08:15	95		97				192		20:15	112		88				200	
08:30	82		110				192		20:30	86		96				182	
08:45	92	364	84	374			176	738	20:45	89	411	59	343			148	754
09:00	116		105				221		21:00	89		68				157	
09:15	108		112				220		21:15	75		90				165	
09:30	123		127				250		21:30	65		63				128	
09:45	143	490	103	447			246	937	21:45	59	288	73	294			132	582
10:00	119		120				239		22:00	48		53				101	
10:15	107		134				241		22:15	61		31				92	
10:30	117		115				232		22:30	42		24				66	
10:45	155	498	136	505			291	1003	22:45	36	187	26	134			62	321
11:00	136		157				293		23:00	29		32				61	
11:15	147		164				311		23:15	24		27				51	
11:30	136		162				298		23:30	23		14				37	
11:45	175	594	146	629			321	1223	23:45	25	101	17	90			42	191
TOTALS		2601		2915				5516	TOTALS		6939		5853				12792
SPLIT %		47.2%		52.8%				30.1%	SPLIT %		54.2%		45.8%				69.9%

DAILY TOTALS	NB	SB	EB	WB	Total
	9,540	8,768	0	0	18,308

AM Peak Hour	11:45	11:15			11:45	PM Peak Hour	17:15	16:45			17:00
AM Pk Volume	653	650			1301	PM Pk Volume	923	697			1591
Pk Hr Factor	0.933	0.913			0.940	Pk Hr Factor	0.927	0.898			0.982
7 - 9 Volume	631	765	0	0	1396	4 - 6 Volume	1753	1316	0	0	3069
7 - 9 Peak Hour	08:00	07:15			08:00	4 - 6 Peak Hour	17:00	16:45			17:00
7 - 9 Pk Volume	364	393	0	0	738	4 - 6 Pk Volume	909	697	0	0	1591
Pk Hr Factor	0.958	0.826	0.000	0.000	0.961	Pk Hr Factor	0.913	0.898	0.000	0.000	0.982

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Vista Way & Eaton St

Day: Tuesday
Date: 8/6/2013

City: Oceanside
Project #: CA13_4290_009

DAILY TOTALS	NB	SB	EB	WB	Total
	8,137	8,525	0	0	16,662

AM Period	NB		SB		EB		WB		TOTAL	
00:00	11		5						16	
00:15	10		7						17	
00:30	10		8						18	
00:45	6	37	11	31					17	68
01:00	9		4						13	
01:15	11		4						15	
01:30	14		7						21	
01:45	13	47	12	27					25	74
02:00	5		5						10	
02:15	6		2						8	
02:30	2		1						3	
02:45	3	16	2	10					5	26
03:00	4		1						5	
03:15	5		1						6	
03:30	2		2						4	
03:45	5	16	2	6					7	22
04:00	1		3						4	
04:15	3		4						7	
04:30	3		8						11	
04:45	3	10	9	24					12	34
05:00	4		22						26	
05:15	8		22						30	
05:30	12		25						37	
05:45	17	41	54	123					71	164
06:00	19		43						62	
06:15	23		73						96	
06:30	36		109						145	
06:45	33	111	99	324					132	435
07:00	51		116						167	
07:15	45		158						203	
07:30	52		147						199	
07:45	75	223	142	563					217	786
08:00	72		159						231	
08:15	54		131						185	
08:30	68		124						192	
08:45	82	276	145	559					227	835
09:00	79		112						191	
09:15	105		120						225	
09:30	87		108						195	
09:45	99	370	129	469					228	839
10:00	98		133						231	
10:15	111		131						242	
10:30	145		146						291	
10:45	130	484	141	551					271	1035
11:00	135		146						281	
11:15	117		162						279	
11:30	147		184						331	
11:45	127	526	164	656					291	1182
TOTALS		2157		3343						5500
SPLIT %		39.2%		60.8%						33.0%

PM Period	NB		SB		EB		WB		TOTAL	
12:00	139		140						279	
12:15	141		144						285	
12:30	136		175						311	
12:45	138	554	155	614					293	1168
13:00	162		172						334	
13:15	138		173						311	
13:30	142		158						300	
13:45	127	569	188	691					315	1260
14:00	148		151						299	
14:15	146		151						297	
14:30	170		169						339	
14:45	177	641	146	617					323	1258
15:00	173		163						336	
15:15	176		132						308	
15:30	187		164						351	
15:45	176	712	143	602					319	1314
16:00	183		154						337	
16:15	169		145						314	
16:30	204		166						370	
16:45	201	757	149	614					350	1371
17:00	219		138						357	
17:15	182		143						325	
17:30	231		142						373	
17:45	187	819	127	550					314	1369
18:00	159		118						277	
18:15	163		134						297	
18:30	144		124						268	
18:45	139	605	110	486					249	1091
19:00	125		103						228	
19:15	113		137						250	
19:30	140		65						205	
19:45	112	490	97	402					209	892
20:00	108		76						184	
20:15	96		69						165	
20:30	90		57						147	
20:45	95	389	58	260					153	649
21:00	55		41						96	
21:15	58		58						116	
21:30	58		43						101	
21:45	44	215	33	175					77	390
22:00	43		33						76	
22:15	26		32						58	
22:30	42		20						62	
22:45	25	136	24	109					49	245
23:00	28		20						48	
23:15	21		17						38	
23:30	23		14						37	
23:45	21	93	11	62					32	155
TOTALS		5980		5182						11162
SPLIT %		53.6%		46.4%						67.0%

DAILY TOTALS	NB	SB	EB	WB	Total
	8,137	8,525	0	0	16,662

AM Peak Hour	11:30	11:00			11:30
AM Pk Volume	554	656			1186
Pk Hr Factor	0.942	0.891			0.896
7 - 9 Volume	499	1122	0	0	1621
7 - 9 Peak Hour	08:00	07:15			07:15
7 - 9 Pk Volume	276	606	0	0	850
Pk Hr Factor	0.841	0.953	0.000	0.000	0.920

PM Peak Hour	16:45	13:00			16:45
PM Pk Volume	833	691			1405
Pk Hr Factor	0.902	0.919			0.942
4 - 6 Volume	1576	1164	0	0	2740
4 - 6 Peak Hour	16:45	16:00			16:45
4 - 6 Pk Volume	833	614	0	0	1405
Pk Hr Factor	0.902	0.925	0.000	0.000	0.942

Prepared by NDS/ATD

VOLUME

Coast Highway btwn Vista Way & Eaton St

Day: Wednesday
Date: 8/7/2013

City: Oceanside
Project #: CA13_4290_009

DAILY TOTALS	NB	SB	EB	WB	Total
	8,608	8,359	0	0	16,967

AM Period	NB		SB		EB		WB		TOTAL	
00:00	16		10						26	
00:15	12		14						26	
00:30	13		8						21	
00:45	7	48	7	39					14	87
01:00	7		9						16	
01:15	6		1						7	
01:30	11		3						14	
01:45	11	35	4	17					15	52
02:00	3		3						6	
02:15	7		2						9	
02:30	3		1						4	
02:45	2	15	3	9					5	24
03:00	2		1						3	
03:15	1		4						5	
03:30	5		2						7	
03:45	3	11	0	7					3	18
04:00	4		3						7	
04:15	0		9						9	
04:30	5		1						6	
04:45	4	13	14	27					18	40
05:00	3		26						29	
05:15	11		18						29	
05:30	17		25						42	
05:45	18	49	57	126					75	175
06:00	22		49						71	
06:15	29		84						113	
06:30	39		104						143	
06:45	38	128	107	344					145	472
07:00	48		113						161	
07:15	64		119						183	
07:30	61		122						183	
07:45	79	252	131	485					210	737
08:00	59		112						171	
08:15	90		118						208	
08:30	60		96						156	
08:45	90	299	96	422					186	721
09:00	97		115						212	
09:15	91		106						197	
09:30	100		113						213	
09:45	114	402	131	465					245	867
10:00	88		123						211	
10:15	100		118						218	
10:30	94		119						213	
10:45	126	408	130	490					256	898
11:00	110		139						249	
11:15	133		137						270	
11:30	122		159						281	
11:45	129	494	167	602					296	1096
TOTALS		2154		3033						**5187**
SPLIT %		41.5%		58.5%						**30.6%**

PM Period	NB		SB		EB		WB		TOTAL	
12:00	144		184						328	
12:15	144		177						321	
12:30	129		169						298	
12:45	147	564	175	705					322	1269
13:00	162		155						317	
13:15	136		160						296	
13:30	169		149						318	
13:45	150	617	165	629					315	1246
14:00	150		147						297	
14:15	161		163						324	
14:30	151		174						325	
14:45	165	627	141	625					306	1252
15:00	164		154						318	
15:15	196		138						334	
15:30	192		136						328	
15:45	184	736	146	574					330	1310
16:00	198		171						369	
16:15	163		139						302	
16:30	229		167						396	
16:45	246	836	169	646					415	1482
17:00	218		166						384	
17:15	231		158						389	
17:30	216		175						391	
17:45	244	909	149	648					393	1557
18:00	191		136						327	
18:15	164		138						302	
18:30	165		116						281	
18:45	158	678	115	505					273	1183
19:00	160		110						270	
19:15	152		108						260	
19:30	147		92						239	
19:45	148	607	94	404					242	1011
20:00	131		82						213	
20:15	114		59						173	
20:30	81		55						136	
20:45	83	409	42	238					125	647
21:00	80		47						127	
21:15	69		56						125	
21:30	58		36						94	
21:45	45	252	46	185					91	437
22:00	52		45						97	
22:15	50		21						71	
22:30	24		20						44	
22:45	26	152	17	103					43	255
23:00	27		25						52	
23:15	11		17						28	
23:30	17		9						26	
23:45	12	67	13	64					25	131
TOTALS		6454		5326						**11780**
SPLIT %		54.8%		45.2%						**69.4%**

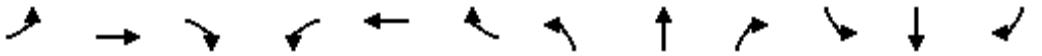
DAILY TOTALS	NB	SB	EB	WB	Total
	8,608	8,359	0	0	16,967

AM Peak Hour	11:45	11:45			**11:45**
AM Pk Volume	546	697			**1243**
Pk Hr Factor	0.948	0.947			**0.947**
7 - 9 Volume	551	907	0	0	**1458**
7 - 9 Peak Hour	08:00	07:00			**07:30**
7 - 9 Pk Volume	299	485	0	0	**772**
Pk Hr Factor	0.831	0.926	0.000	0.000	**0.919**

PM Peak Hour	16:30	12:00			**16:30**
PM Pk Volume	924	705			**1584**
Pk Hr Factor	0.939	0.958			**0.954**
4 - 6 Volume	1745	1294	0	0	**3039**
4 - 6 Peak Hour	16:30	16:45			**16:30**
4 - 6 Pk Volume	924	668	0	0	**1584**
Pk Hr Factor	0.939	0.954	0.000	0.000	**0.954**

HCM Signalized Intersection Capacity Analysis
1: Coast Hwy/I-5 Ramps & Harbor Dr

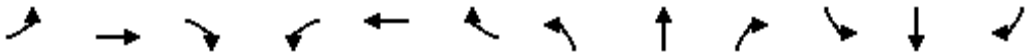
9/1/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	78	51	71	290	486	142	14	107	71	18	66
Future Volume (vph)	85	78	51	71	290	486	142	14	107	71	18	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3158	1441		1782	1583		1792	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3158	1441		1782	1583		1792	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	85	55	77	315	528	154	15	116	77	20	72
RTOR Reduction (vph)	0	0	48	0	205	216	0	0	83	0	0	56
Lane Group Flow (vph)	92	85	7	77	374	48	0	169	33	0	97	16
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.4	9.5	9.5	5.4	13.1	13.1		20.3	20.3		16.1	16.1
Effective Green, g (s)	5.4	9.5	9.5	5.4	13.1	13.1		20.3	20.3		16.1	16.1
Actuated g/C Ratio	0.07	0.13	0.13	0.07	0.18	0.18		0.28	0.28		0.22	0.22
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	132	245	208	132	573	261		501	445		400	353
v/s Ratio Prot	c0.05	0.05		0.04	c0.12			c0.09			c0.05	
v/s Ratio Perm			0.00			0.03			0.02			0.01
v/c Ratio	0.70	0.35	0.03	0.58	0.65	0.18		0.34	0.07		0.24	0.05
Uniform Delay, d1	32.6	28.5	27.3	32.3	27.4	25.0		20.6	19.0		23.0	22.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	14.8	0.3	0.0	6.4	2.0	0.1		1.8	0.3		1.4	0.2
Delay (s)	47.4	28.8	27.3	38.7	29.4	25.1		22.4	19.3		24.4	22.2
Level of Service	D	C	C	D	C	C		C	B		C	C
Approach Delay (s)		35.8			29.0			21.1			23.5	
Approach LOS		D			C			C			C	

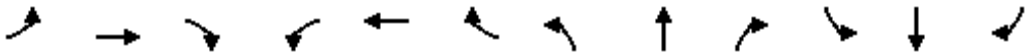
Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	72.1	Sum of lost time (s)	20.8
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	2	325	0	239	1	113	369	76	105	0
Future Volume (vph)	0	0	2	325	0	239	1	113	369	76	105	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6		4.6	4.6	4.0		4.6	4.0		4.6	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95	1.00		0.95	
Frt		0.86		1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00		0.95	0.95	1.00		1.00	1.00		0.98	
Satd. Flow (prot)		1611		1681	1681	1583		3538	1583		3466	
Flt Permitted		1.00		0.95	0.95	1.00		1.00	1.00		0.98	
Satd. Flow (perm)		1611		1681	1681	1583		3538	1583		3466	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2	353	0	260	1	123	401	83	114	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	176	177	260	0	124	401	0	197	0
Turn Type		NA		Split	NA	Free	Split	NA	Free	Split	NA	
Protected Phases		4		8	8		2	2		6	6	
Permitted Phases	4					Free			Free			
Actuated Green, G (s)		1.0		9.9	9.9	65.5		18.1	65.5		18.1	
Effective Green, g (s)		1.0		9.9	9.9	65.5		18.1	65.5		18.1	
Actuated g/C Ratio		0.02		0.15	0.15	1.00		0.28	1.00		0.28	
Clearance Time (s)		4.6		4.6	4.6			4.6			4.6	
Vehicle Extension (s)		3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		24		254	254	1583		977	1583		957	
v/s Ratio Prot		0.00		0.10	c0.11			0.04			0.06	
v/s Ratio Perm						0.16			c0.25			
v/c Ratio		0.00		0.69	0.70	0.16		0.13	0.25		0.21	
Uniform Delay, d1		31.8		26.4	26.4	0.0		17.8	0.0		18.2	
Progression Factor		1.00		1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0		7.9	8.1	0.2		0.3	0.4		0.5	
Delay (s)		31.8		34.3	34.4	0.2		18.0	0.4		18.7	
Level of Service		C		C	C	A		B	A		B	
Approach Delay (s)		31.8			19.9			4.6			18.7	
Approach LOS		C			B			A			B	

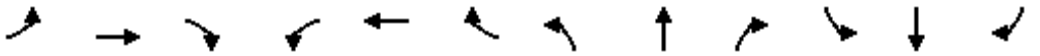
Intersection Summary			
HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	65.5	Sum of lost time (s)	18.4
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		
Description: SR-76 & Coast Hwy			
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	4	39	9	29	50	53	28	43	42	79	59	12
Future Volume (vph)	4	39	9	29	50	53	28	43	42	79	59	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	42	10	32	54	58	30	47	46	86	64	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	56	144	123	163
Volume Left (vph)	4	32	30	86
Volume Right (vph)	10	58	46	13
Hadj (s)	-0.06	-0.16	-0.14	0.09
Departure Headway (s)	4.7	4.5	4.4	4.6
Degree Utilization, x	0.07	0.18	0.15	0.21
Capacity (veh/h)	704	748	767	738
Control Delay (s)	8.1	8.5	8.2	8.8
Approach Delay (s)	8.1	8.5	8.2	8.8
Approach LOS	A	A	A	A

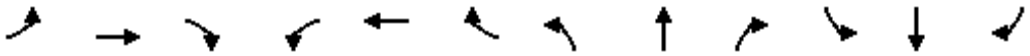
Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	35.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	11	31	6	21	43	29	218	13	17	299	64
Future Volume (vph)	112	11	31	6	21	43	29	218	13	17	299	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.92		1.00	0.99		1.00	0.97	
Flt Protected		0.96	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1782	1583		1702		1770	3510		1770	3445	
Flt Permitted		0.74	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1374	1583		1679		1770	3510		1770	3445	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	122	12	34	7	23	47	32	237	14	18	325	70
RTOR Reduction (vph)	0	0	25	0	35	0	0	6	0	0	16	0
Lane Group Flow (vph)	0	134	9	0	42	0	32	245	0	18	379	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		10.6	10.6		10.6		1.6	8.9		11.6	23.7	
Effective Green, g (s)		10.6	10.6		10.6		1.6	8.9		11.6	23.7	
Actuated g/C Ratio		0.25	0.25		0.25		0.04	0.21		0.28	0.57	
Clearance Time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		3.0	7.0	
Lane Grp Cap (vph)		347	400		424		67	745		490	1948	
v/s Ratio Prot							c0.02	c0.07		0.01	c0.11	
v/s Ratio Perm		c0.10	0.01		0.02							
v/c Ratio		0.39	0.02		0.10		0.48	0.33		0.04	0.19	
Uniform Delay, d1		13.0	11.8		12.0		19.7	14.0		11.1	4.4	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.5	0.1		0.4		5.3	0.3		0.0	0.2	
Delay (s)		15.5	11.8		12.4		25.0	14.2		11.1	4.6	
Level of Service		B	B		B		C	B		B	A	
Approach Delay (s)		14.7			12.4			15.5			4.9	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	41.9	Sum of lost time (s)	10.8
Intersection Capacity Utilization	40.4%	ICU Level of Service	A
Analysis Period (min)	15		

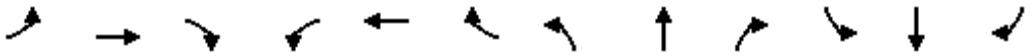
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	7	6	18	10	18	5	210	22	52	250	9
Future Volume (vph)	9	7	6	18	10	18	5	210	22	52	250	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frt	1.00	0.93		1.00	0.90			0.99			1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	1732		1770	1682			3486			3494	
Flt Permitted	0.74	1.00		0.75	1.00			0.95			0.85	
Satd. Flow (perm)	1373	1732		1393	1682			3300			3011	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	8	7	20	11	20	5	228	24	57	272	10
RTOR Reduction (vph)	0	3	0	0	9	0	0	17	0	0	5	0
Lane Group Flow (vph)	10	12	0	20	22	0	0	240	0	0	334	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	25.8	25.8		25.8	25.8			11.3			11.3	
Effective Green, g (s)	25.8	25.8		25.8	25.8			11.3			11.3	
Actuated g/C Ratio	0.56	0.56		0.56	0.56			0.25			0.25	
Clearance Time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	771	973		782	945			812			741	
v/s Ratio Prot		0.01			0.01							
v/s Ratio Perm	0.01			c0.01				0.07			c0.11	
v/c Ratio	0.01	0.01		0.03	0.02			0.30			0.45	
Uniform Delay, d1	4.4	4.4		4.5	4.5			14.1			14.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.0	0.0		0.1	0.0			0.3			0.6	
Delay (s)	4.5	4.5		4.5	4.5			14.3			15.3	
Level of Service	A	A		A	A			B			B	
Approach Delay (s)		4.5			4.5			14.3			15.3	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.16		
Actuated Cycle Length (s)	45.9	Sum of lost time (s)	8.8
Intersection Capacity Utilization	35.9%	ICU Level of Service	A
Analysis Period (min)	15		

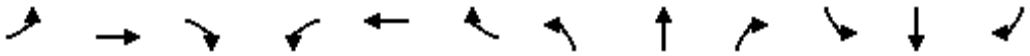
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	9	9	10	14	15	7	217	11	11	236	18
Future Volume (vph)	6	9	9	10	14	15	7	217	11	11	236	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00			1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00			1.00	
Frt	1.00	0.93		1.00	0.92			0.99			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1745	1704		1754	1695			3503			3485	
Flt Permitted	0.74	1.00		0.74	1.00			0.94			0.93	
Satd. Flow (perm)	1354	1704		1374	1695			3290			3264	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	10	10	11	15	16	8	236	12	12	257	20
RTOR Reduction (vph)	0	4	0	0	6	0	0	7	0	0	10	0
Lane Group Flow (vph)	7	16	0	11	25	0	0	249	0	0	279	0
Confl. Peds. (#/hr)	16		11	11		16	10		17	17		10
Confl. Bikes (#/hr)			2			2						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	31.8	31.8		31.0	31.0			9.4			9.9	
Effective Green, g (s)	31.8	31.8		31.0	31.0			9.4			9.9	
Actuated g/C Ratio	0.63	0.63		0.62	0.62			0.19			0.20	
Clearance Time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Vehicle Extension (s)	3.0	3.0		3.5	3.5			3.0			3.5	
Lane Grp Cap (vph)	854	1075		845	1042			613			641	
v/s Ratio Prot		0.01			c0.01							
v/s Ratio Perm	0.01			0.01				0.08			c0.09	
v/c Ratio	0.01	0.02		0.01	0.02			0.41			0.43	
Uniform Delay, d1	3.4	3.5		3.8	3.8			18.0			17.8	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.0	0.0		0.0	0.0			0.4			0.6	
Delay (s)	3.5	3.5		3.8	3.8			18.5			18.4	
Level of Service	A	A		A	A			B			B	
Approach Delay (s)		3.5			3.8			18.5			18.4	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.12		
Actuated Cycle Length (s)	50.4	Sum of lost time (s)	10.0
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		

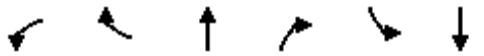
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	5	19	17	9	5	88	137	6	7	94	6
Future Volume (vph)	2	5	19	17	9	5	88	137	6	7	94	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	5	21	18	10	5	96	149	7	8	102	7

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	7	21	33	252	117
Volume Left (vph)	2	0	18	96	8
Volume Right (vph)	0	21	5	7	7
Hadj (s)	0.18	-0.67	0.05	0.09	0.01
Departure Headway (s)	5.5	4.7	4.9	4.3	4.3
Degree Utilization, x	0.01	0.03	0.05	0.30	0.14
Capacity (veh/h)	599	704	670	824	801
Control Delay (s)	7.4	6.6	8.2	9.1	8.0
Approach Delay (s)	6.8		8.2	9.1	8.0
Approach LOS	A		A	A	A

Intersection Summary				
Delay	8.6			
Level of Service	A			
Intersection Capacity Utilization	34.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	80	46	74	56	27	65
Future Volume (vph)	80	46	74	56	27	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	50	80	61	29	71

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	87	50	141	100
Volume Left (vph)	87	0	0	29
Volume Right (vph)	0	50	61	0
Hadj (s)	0.53	-0.67	-0.23	0.09
Departure Headway (s)	5.6	4.4	4.1	4.5
Degree Utilization, x	0.13	0.06	0.16	0.12
Capacity (veh/h)	612	779	835	763
Control Delay (s)	8.2	6.5	7.9	8.1
Approach Delay (s)	7.6		7.9	8.1
Approach LOS	A		A	A

Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Year 2013 No Project

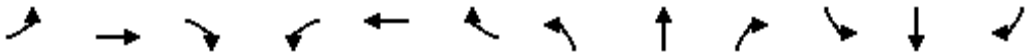
Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #9 Cleveland Street and Mission Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.093
Loss Time (sec):	0	Average Delay (sec/veh):	8.1
Optimal Cycle:	0	Level Of Service:	A

Street Name:	Cleveland Street						Mission Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	0	0 1	0	0 1!	0	0	1 0	1 1	0	1 0	1 1	0
Volume Module:													
Base Vol:	10	10	14	10	13	25	11	91	7	39	111	23
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	10	10	14	10	13	25	11	91	7	39	111	23
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	10	10	14	10	13	25	11	91	7	39	111	23
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	10	10	14	10	13	25	11	91	7	39	111	23
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	10	10	14	10	13	25	11	91	7	39	111	23
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.50	0.50	1.00	0.21	0.27	0.52	1.00	1.86	0.14	1.00	1.66	0.34
Final Sat.:	315	315	755	145	189	363	628	1290	100	646	1199	256
Capacity Analysis Module:												
Vol/Sat:	0.03	0.03	0.02	0.07	0.07	0.07	0.02	0.07	0.07	0.06	0.09	0.09
Crit Moves:	****			****			****			****		
Delay/Veh:	8.3	8.3	7.3	8.3	8.3	8.3	8.4	8.1	8.0	8.5	8.0	7.9
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	8.3	8.3	7.3	8.3	8.3	8.3	8.4	8.1	8.0	8.5	8.0	7.9
LOS by Move:	A	A	A	A	A	A	A	A	A	A	A	A
ApproachDel:	7.9			8.3			8.1			8.1		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	7.9			8.3			8.1			8.1		
LOS by Appr:	A			A			A			A		
AllWayAvgQ:	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1

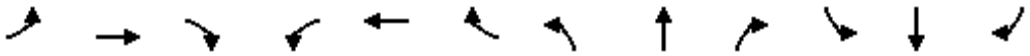
Note: Queue reported is the number of cars per lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	23	124	189	64	14	172	0	0	194	15
Future Volume (vph)	11	0	23	124	189	64	14	172	0	0	194	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95		1.00	0.95			0.95	
Frpb, ped/bikes	1.00		0.98	1.00	0.99		1.00	1.00			1.00	
Flpb, ped/bikes	0.99		1.00	0.99	1.00		1.00	1.00			1.00	
Frt	1.00		0.85	1.00	0.96		1.00	1.00			0.99	
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1757		1546	1750	3385		1770	3539			3494	
Flt Permitted	0.58		1.00	0.95	1.00		0.61	1.00			1.00	
Satd. Flow (perm)	1078		1546	1750	3385		1137	3539			3494	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	0	25	135	205	70	15	187	0	0	211	16
RTOR Reduction (vph)	0	0	8	0	23	0	0	0	0	0	9	0
Lane Group Flow (vph)	12	0	17	135	252	0	15	187	0	0	218	0
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type	Perm		Perm	Perm	NA		Perm	NA			NA	
Protected Phases					8			2			6	
Permitted Phases	4		4	8			2					
Actuated Green, G (s)	41.0		41.0	41.0	41.0		10.6	10.6			10.6	
Effective Green, g (s)	41.0		41.0	41.0	41.0		10.6	10.6			10.6	
Actuated g/C Ratio	0.67		0.67	0.67	0.67		0.17	0.17			0.17	
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0		4.0	4.0			4.0	
Lane Grp Cap (vph)	717		1028	1164	2253		195	608			601	
v/s Ratio Prot					0.07			0.05			c0.06	
v/s Ratio Perm	0.01		0.01	c0.08			0.01					
v/c Ratio	0.02		0.02	0.12	0.11		0.08	0.31			0.36	
Uniform Delay, d1	3.5		3.5	3.7	3.7		21.4	22.3			22.5	
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.0		0.0	0.2	0.1		0.2	0.4			0.5	
Delay (s)	3.5		3.5	3.9	3.8		21.6	22.7			23.0	
Level of Service	A		A	A	A		C	C			C	
Approach Delay (s)		3.5			3.9			22.6			23.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	61.6	Sum of lost time (s)	10.0
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	132	2	50	462	194	3	14	202	132	10	7
Future Volume (vph)	5	132	2	50	462	194	3	14	202	132	10	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.86		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.96	
Satd. Flow (prot)	1770	3532		1770	3539	1583	1770	1601		1681	1679	
Flt Permitted	0.47	1.00		0.66	1.00	1.00	0.70	1.00		0.61	0.68	
Satd. Flow (perm)	871	3532		1229	3539	1583	1308	1601		1084	1184	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	143	2	54	502	211	3	15	220	143	11	8
RTOR Reduction (vph)	0	1	0	0	0	133	0	147	0	0	3	0
Lane Group Flow (vph)	5	144	0	54	502	78	3	88	0	82	77	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	12.2	12.2		11.8	11.8	11.8	10.7	10.7		10.7	10.7	
Effective Green, g (s)	12.2	12.2		11.8	11.8	11.8	10.7	10.7		10.7	10.7	
Actuated g/C Ratio	0.38	0.38		0.37	0.37	0.37	0.33	0.33		0.33	0.33	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	331	1342		451	1300	581	436	533		361	394	
v/s Ratio Prot		0.04			c0.14			0.06				
v/s Ratio Perm	0.01			0.04		0.05	0.00			c0.08	0.06	
v/c Ratio	0.02	0.11		0.12	0.39	0.13	0.01	0.17		0.23	0.19	
Uniform Delay, d1	6.2	6.4		6.7	7.5	6.8	7.1	7.6		7.7	7.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.0		0.1	0.2	0.1	0.0	0.2		0.4	0.3	
Delay (s)	6.2	6.5		6.9	7.7	6.9	7.2	7.8		8.2	8.0	
Level of Service	A	A		A	A	A	A	A		A	A	
Approach Delay (s)		6.5			7.4			7.7			8.1	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	32.1	Sum of lost time (s)	9.6
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		

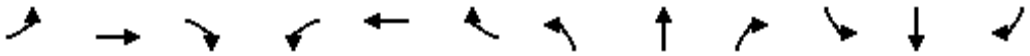
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	35	12	44	60	11	17
Future Volume (Veh/h)	35	12	44	60	11	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	13	48	65	12	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			51		206	44
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			51		206	44
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		98	98
cM capacity (veh/h)			1555		759	1025

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	51	113	30
Volume Left	0	48	12
Volume Right	13	0	18
cSH	1700	1555	899
Volume to Capacity	0.03	0.03	0.03
Queue Length 95th (ft)	0	2	3
Control Delay (s)	0.0	3.3	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	3.3	9.1
Approach LOS			A

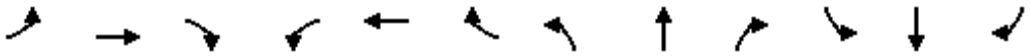
Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	22.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	115	21	0	0	0	23	230	99	37	261	39
Future Volume (vph)	16	115	21	0	0	0	23	230	99	37	261	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00					1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00					1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00					1.00	1.00		1.00	1.00	
Frt	1.00	0.98					1.00	0.95		1.00	0.98	
Flt Protected	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1811					1770	3359		1770	3453	
Flt Permitted	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1811					1770	3359		1770	3453	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	125	23	0	0	0	25	250	108	40	284	42
RTOR Reduction (vph)	0	11	0	0	0	0	0	84	0	0	26	0
Lane Group Flow (vph)	17	137	0	0	0	0	25	274	0	40	300	0
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA		Prot	NA	
Protected Phases	4	4					5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	18.0	18.0					4.0	10.2		3.8	10.0	
Effective Green, g (s)	18.0	18.0					4.0	10.2		3.8	10.0	
Actuated g/C Ratio	0.40	0.40					0.09	0.23		0.08	0.22	
Clearance Time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0					3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	708	724					157	761		149	767	
v/s Ratio Prot	0.01	c0.08					0.01	0.08		c0.02	c0.09	
v/s Ratio Perm												
v/c Ratio	0.02	0.19					0.16	0.36		0.27	0.39	
Uniform Delay, d1	8.2	8.8					18.9	14.7		19.3	14.9	
Progression Factor	1.00	1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.6					2.2	0.4		4.4	0.5	
Delay (s)	8.2	9.3					21.1	15.1		23.7	15.4	
Level of Service	A	A					C	B		C	B	
Approach Delay (s)		9.2			0.0			15.4			16.3	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

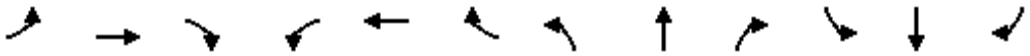
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	240	7	0	0	0	0	10	15	9	7	0
Future Volume (Veh/h)	5	240	7	0	0	0	0	10	15	9	7	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	261	8	0	0	0	0	11	16	10	8	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			269			279	275	134	162	279	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			269			279	275	134	162	279	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	98	98	99	99	100
cM capacity (veh/h)	1622			1292			644	629	890	761	626	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	136	138	27	18
Volume Left	5	0	0	10
Volume Right	0	8	16	0
cSH	1622	1700	761	695
Volume to Capacity	0.00	0.08	0.04	0.03
Queue Length 95th (ft)	0	0	3	2
Control Delay (s)	0.3	0.0	9.9	10.3
Lane LOS	A		A	B
Approach Delay (s)	0.1		9.9	10.3
Approach LOS			A	B

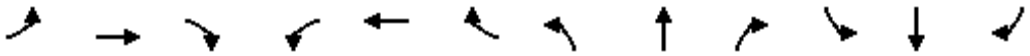
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	21.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	242	3	0	0	0	0	14	10	13	15	0
Future Volume (vph)	17	242	3	0	0	0	0	14	10	13	15	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	263	3	0	0	0	0	15	11	14	16	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	150	135	26	30
Volume Left (vph)	18	0	0	14
Volume Right (vph)	0	3	11	0
Hadj (s)	0.09	0.02	-0.22	0.13
Departure Headway (s)	4.7	4.7	4.4	4.7
Degree Utilization, x	0.20	0.17	0.03	0.04
Capacity (veh/h)	751	758	778	719
Control Delay (s)	7.7	7.4	7.5	7.9
Approach Delay (s)	7.6		7.5	7.9
Approach LOS	A		A	A

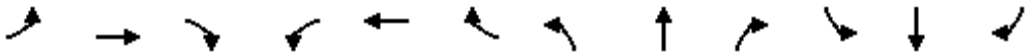
Intersection Summary				
Delay	7.6			
Level of Service	A			
Intersection Capacity Utilization	22.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	142	122	1	4	0	3	0	17	9	0	0	0
Future Volume (vph)	142	122	1	4	0	3	0	17	9	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	154	133	1	4	0	3	0	18	10	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	154	134	7	28
Volume Left (vph)	154	0	4	0
Volume Right (vph)	0	1	3	10
Hadj (s)	0.53	0.03	-0.11	-0.18
Departure Headway (s)	5.1	4.6	4.2	4.4
Degree Utilization, x	0.22	0.17	0.01	0.03
Capacity (veh/h)	698	769	833	773
Control Delay (s)	8.3	7.3	7.3	7.5
Approach Delay (s)	7.9		7.3	7.5
Approach LOS	A		A	A

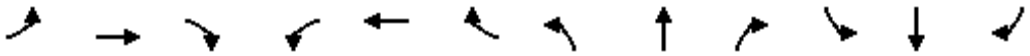
Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	22.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1	13	12	3	11	13	263	7	5	272	6
Future Volume (Veh/h)	8	1	13	12	3	11	13	263	7	5	272	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	1	14	13	3	12	14	286	8	5	296	7
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			440	
pX, platoon unblocked												
vC, conflicting volume	502	646	158	498	645	155	310			301		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	502	646	158	498	645	155	310			301		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	98	97	99	99	99			100		
cM capacity (veh/h)	431	379	854	436	379	857	1240			1250		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	24	28	157	151	153	155
Volume Left	9	13	14	0	5	0
Volume Right	14	12	0	8	0	7
cSH	601	541	1240	1700	1250	1700
Volume to Capacity	0.04	0.05	0.01	0.09	0.00	0.09
Queue Length 95th (ft)	3	4	1	0	0	0
Control Delay (s)	11.2	12.0	0.8	0.0	0.3	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	11.2	12.0	0.4		0.1	
Approach LOS	B	B				

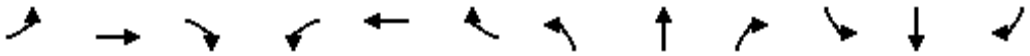
Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	27.5%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	1	7	3	0	3	5	278	8	2	290	5
Future Volume (Veh/h)	4	1	7	3	0	3	5	278	8	2	290	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	1	8	3	0	3	5	302	9	2	315	5
Pedestrians		11			7						12	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								831			870	
pX, platoon unblocked												
vC, conflicting volume	508	660	171	494	658	174	331			318		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	508	660	171	494	658	174	331			318		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	99	100	100	100			100		
cM capacity (veh/h)	430	373	835	444	374	825	1214			1232		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	13	6	156	160	160	162
Volume Left	4	3	5	0	2	0
Volume Right	8	3	0	9	0	5
cSH	603	577	1214	1700	1232	1700
Volume to Capacity	0.02	0.01	0.00	0.09	0.00	0.10
Queue Length 95th (ft)	2	1	0	0	0	0
Control Delay (s)	11.1	11.3	0.3	0.0	0.1	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	11.1	11.3	0.1		0.1	
Approach LOS	B	B				

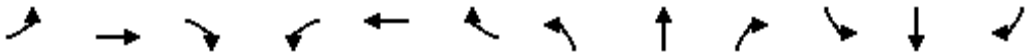
Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	25.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	33	29	13	4	34	5	69	20	40	47	1
Future Volume (vph)	25	33	29	13	4	34	5	69	20	40	47	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	36	32	14	4	37	5	75	22	43	51	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	95	55	102	95
Volume Left (vph)	27	14	5	43
Volume Right (vph)	32	37	22	1
Hadj (s)	-0.11	-0.32	-0.09	0.12
Departure Headway (s)	4.3	4.1	4.3	4.5
Degree Utilization, x	0.11	0.06	0.12	0.12
Capacity (veh/h)	797	813	807	765
Control Delay (s)	7.8	7.4	7.8	8.1
Approach Delay (s)	7.8	7.4	7.8	8.1
Approach LOS	A	A	A	A

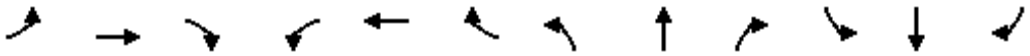
Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	24.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	126	10	2	58	10	5	12	13	14	17	7
Future Volume (Veh/h)	5	126	10	2	58	10	5	12	13	14	17	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	137	11	2	63	11	5	13	14	15	18	8
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	88			155			250	252	150	260	252	84
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88			155			250	252	150	260	252	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	98	98	98	97	99
cM capacity (veh/h)	1490			1417			667	637	892	653	637	964

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	153	76	32	41
Volume Left	5	2	5	15
Volume Right	11	11	14	8
cSH	1490	1417	734	689
Volume to Capacity	0.00	0.00	0.04	0.06
Queue Length 95th (ft)	0	0	3	5
Control Delay (s)	0.3	0.2	10.1	10.6
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.2	10.1	10.6
Approach LOS			B	B

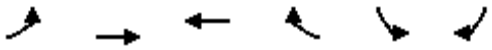
Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	26	92	42	14	13	45	257	30	8	283	12
Future Volume (vph)	36	26	92	42	14	13	45	257	30	8	283	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.88			0.97		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1644			1762		1770	3483		1770	3518	
Flt Permitted	0.91	1.00			0.74		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1693	1644			1342		1770	3483		1770	3518	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	28	100	46	15	14	49	279	33	9	308	13
RTOR Reduction (vph)	0	88	0	0	11	0	0	8	0	0	3	0
Lane Group Flow (vph)	39	40	0	0	64	0	49	304	0	9	318	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	4.4	4.4			4.4		2.3	17.7		0.9	16.3	
Effective Green, g (s)	4.4	4.4			4.4		2.3	17.7		0.9	16.3	
Actuated g/C Ratio	0.12	0.12			0.12		0.06	0.49		0.03	0.45	
Clearance Time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	206	200			164		113	1712		44	1592	
v/s Ratio Prot		0.02					c0.03	0.09		0.01	c0.09	
v/s Ratio Perm	0.02				c0.05							
v/c Ratio	0.19	0.20			0.39		0.43	0.18		0.20	0.20	
Uniform Delay, d1	14.2	14.2			14.6		16.2	5.1		17.2	5.9	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.5			1.6		2.7	0.1		2.3	0.1	
Delay (s)	14.6	14.7			16.1		18.9	5.2		19.5	6.0	
Level of Service	B	B			B		B	A		B	A	
Approach Delay (s)		14.7			16.1			7.0			6.4	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	36.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	33.0%	ICU Level of Service	A
Analysis Period (min)	15		

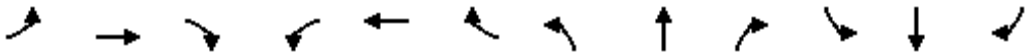
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	60	58	3	10	9
Future Volume (Veh/h)	5	60	58	3	10	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	65	63	3	11	10
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	74				148	74
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	74				148	74
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	99
cM capacity (veh/h)	1515				834	981

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	70	66	21
Volume Left	5	0	11
Volume Right	0	3	10
cSH	1515	1700	898
Volume to Capacity	0.00	0.04	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.6	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.6	0.0	9.1
Approach LOS			A

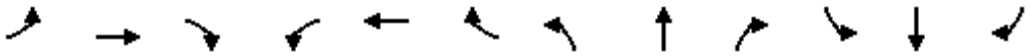
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	56	5	12	53	7	3	4	8	22	1	3
Future Volume (Veh/h)	4	56	5	12	53	7	3	4	8	22	1	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	61	5	13	58	8	3	4	9	24	1	3
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	68			66			165	166	64	172	164	66
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	68			66			165	166	64	172	164	66
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	99	99	97	100	100
cM capacity (veh/h)	1531			1536			787	718	1001	771	719	994

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	70	79	16	28
Volume Left	4	13	3	24
Volume Right	5	8	9	3
cSH	1531	1536	871	788
Volume to Capacity	0.00	0.01	0.02	0.04
Queue Length 95th (ft)	0	1	1	3
Control Delay (s)	0.4	1.3	9.2	9.7
Lane LOS	A	A	A	A
Approach Delay (s)	0.4	1.3	9.2	9.7
Approach LOS			A	A

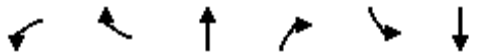
Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	19.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	33	52	20	42	0	28	0	10	0	2	0
Future Volume (vph)	0	33	52	20	42	0	28	0	10	0	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	36	57	22	46	0	30	0	11	0	2	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	93	68	41	2
Volume Left (vph)	0	22	30	0
Volume Right (vph)	57	0	11	0
Hadj (s)	-0.33	0.10	0.02	0.03
Departure Headway (s)	3.7	4.2	4.3	4.3
Degree Utilization, x	0.10	0.08	0.05	0.00
Capacity (veh/h)	945	846	808	798
Control Delay (s)	7.1	7.5	7.5	7.3
Approach Delay (s)	7.1	7.5	7.5	7.3
Approach LOS	A	A	A	A

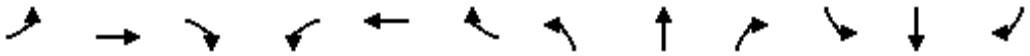
Intersection Summary				
Delay	7.3			
Level of Service	A			
Intersection Capacity Utilization	25.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	32	46	51	20	54	61
Future Volume (vph)	32	46	51	20	54	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	50	55	22	59	66

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	85	77	125
Volume Left (vph)	35	0	59
Volume Right (vph)	50	22	0
Hadj (s)	-0.24	-0.14	0.13
Departure Headway (s)	4.1	4.1	4.3
Degree Utilization, x	0.10	0.09	0.15
Capacity (veh/h)	834	851	818
Control Delay (s)	7.5	7.5	8.0
Approach Delay (s)	7.5	7.5	8.0
Approach LOS	A	A	A

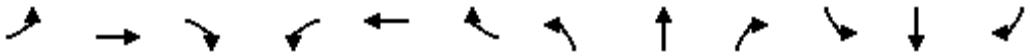
Intersection Summary			
Delay	7.7		
Level of Service	A		
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	132	1	6	106	22	6	7	11	22	11	5
Future Volume (Veh/h)	4	132	1	6	106	22	6	7	11	22	11	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	143	1	7	115	24	7	8	12	24	12	5
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.95						0.95	0.95		0.95	0.95	0.95
vC, conflicting volume	142			155			318	318	162	320	307	134
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	69			155			255	255	162	256	243	61
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	99	99	96	98	99
cM capacity (veh/h)	1450			1412			632	604	868	630	613	948

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	148	146	27	41
Volume Left	4	7	7	24
Volume Right	1	24	12	5
cSH	1450	1412	708	652
Volume to Capacity	0.00	0.00	0.04	0.06
Queue Length 95th (ft)	0	0	3	5
Control Delay (s)	0.2	0.4	10.3	10.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.4	10.3	10.9
Approach LOS			B	B

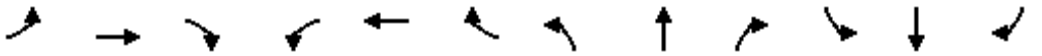
Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	97	52	113	98	109	27	216	60	119	274	11
Future Volume (vph)	15	97	52	113	98	109	27	216	60	119	274	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.96	1.00	1.00	0.96	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1851	1526	1681	1761	1513	1770	3411		1770	3509	
Flt Permitted		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1851	1526	1681	1761	1513	1770	3411		1770	3509	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	105	57	123	107	118	29	235	65	129	298	12
RTOR Reduction (vph)	0	0	51	0	0	103	0	18	0	0	2	0
Lane Group Flow (vph)	0	121	6	111	119	15	29	282	0	129	308	0
Confl. Peds. (#/hr)	14		10	10		14			3			15
Confl. Bikes (#/hr)			4			5			3			3
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		10.9	10.9	12.5	12.5	12.5	4.3	46.2		11.6	53.5	
Effective Green, g (s)		10.9	10.9	12.5	12.5	12.5	4.3	46.2		11.6	53.5	
Actuated g/C Ratio		0.11	0.11	0.12	0.12	0.12	0.04	0.46		0.12	0.54	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.5		2.0	3.5	
Lane Grp Cap (vph)		201	166	210	220	189	76	1575		205	1877	
v/s Ratio Prot		c0.07		0.07	c0.07		0.02	c0.08		c0.07	0.09	
v/s Ratio Perm			0.00			0.01						
v/c Ratio		0.60	0.04	0.53	0.54	0.08	0.38	0.18		0.63	0.16	
Uniform Delay, d1		42.5	39.9	41.0	41.1	38.7	46.6	15.8		42.1	11.9	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.5	0.0	2.7	3.0	0.2	1.2	0.2		4.3	0.2	
Delay (s)		45.9	39.9	43.7	44.1	38.9	47.7	16.0		46.5	12.0	
Level of Service		D	D	D	D	D	D	B		D	B	
Approach Delay (s)		44.0			42.2			18.8			22.2	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	29.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

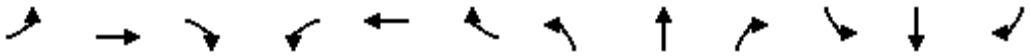
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	274	0	16	353	28	8	5	34	86	8	16
Future Volume (vph)	4	274	0	16	353	28	8	5	34	86	8	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3539		1764	3497			3094			1781	1549
Flt Permitted	0.56	1.00		0.57	1.00			0.89			0.83	1.00
Satd. Flow (perm)	1049	3539		1058	3497			2773			1548	1549
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	298	0	17	384	30	9	5	37	93	9	17
RTOR Reduction (vph)	0	0	0	0	7	0	0	29	0	0	0	13
Lane Group Flow (vph)	4	298	0	17	407	0	0	22	0	0	102	4
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	7.1	7.1		7.1	7.1			4.6			4.6	4.6
Effective Green, g (s)	7.1	7.1		7.1	7.1			4.6			4.6	4.6
Actuated g/C Ratio	0.33	0.33		0.33	0.33			0.22			0.22	0.22
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	351	1185		354	1171			601			335	336
v/s Ratio Prot		0.08			c0.12							
v/s Ratio Perm	0.00			0.02				0.01			c0.07	0.00
v/c Ratio	0.01	0.25		0.05	0.35			0.04			0.30	0.01
Uniform Delay, d1	4.7	5.1		4.8	5.3			6.6			7.0	6.5
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.0	0.1		0.1	0.2			0.0			0.7	0.0
Delay (s)	4.7	5.2		4.8	5.5			6.6			7.7	6.5
Level of Service	A	A		A	A			A			A	A
Approach Delay (s)		5.2			5.5			6.6			7.5	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	21.2	Sum of lost time (s)	9.5
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

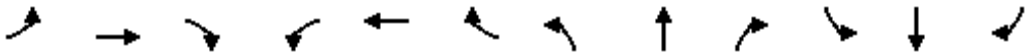
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	8	13	13	5	48	2	292	26	40	394	13
Future Volume (vph)	19	8	13	13	5	48	2	292	26	40	394	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1728			1794	1557	1770	3489		1770	3519	
Flt Permitted		1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1769			1860	1557	1770	3489		1770	3519	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	9	14	14	5	52	2	317	28	43	428	14
RTOR Reduction (vph)	0	13	0	0	0	48	0	5	0	0	2	0
Lane Group Flow (vph)	0	31	0	0	19	4	2	340	0	43	440	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		2.6			2.6	2.6	0.9	17.8		1.1	18.0	
Effective Green, g (s)		2.6			2.6	2.6	0.9	17.8		1.1	18.0	
Actuated g/C Ratio		0.07			0.07	0.07	0.03	0.51		0.03	0.51	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		130			137	115	45	1764		55	1799	
v/s Ratio Prot							0.00	0.10		c0.02	c0.13	
v/s Ratio Perm		c0.02			0.01	0.00						
v/c Ratio		0.24			0.14	0.03	0.04	0.19		0.78	0.24	
Uniform Delay, d1		15.4			15.3	15.1	16.7	4.8		16.9	4.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.2	0.0	0.4	0.1		50.5	0.1	
Delay (s)		15.7			15.4	15.2	17.1	4.8		67.4	4.9	
Level of Service		B			B	B	B	A		E	A	
Approach Delay (s)		15.7			15.2			4.9			10.4	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	35.2	Sum of lost time (s)	13.7
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

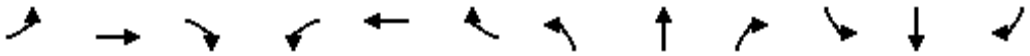
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	60	7	11	52	0	6	0	9	0	0	0
Future Volume (Veh/h)	0	60	7	11	52	0	6	0	9	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	65	8	12	57	0	7	0	10	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	57			73			150	150	69	160	154	57
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	57			73			150	150	69	160	154	57
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	100	99	100	100	100
cM capacity (veh/h)	1547			1527			813	736	994	793	732	1009

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	73	69	17	0
Volume Left	0	12	7	0
Volume Right	8	0	10	0
cSH	1547	1527	910	1700
Volume to Capacity	0.00	0.01	0.02	0.00
Queue Length 95th (ft)	0	1	1	0
Control Delay (s)	0.0	1.3	9.0	0.0
Lane LOS		A	A	A
Approach Delay (s)	0.0	1.3	9.0	0.0
Approach LOS			A	A

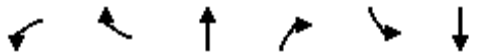
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	20.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	28	4	1	20	1	7	0	3	1	0	1
Future Volume (Veh/h)	1	28	4	1	20	1	7	0	3	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	30	4	1	22	1	8	0	3	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	23			34			60	59	32	62	60	22
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	23			34			60	59	32	62	60	22
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	100	100	100	100
cM capacity (veh/h)	1592			1578			935	831	1042	930	829	1054

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	35	24	11	2
Volume Left	1	1	8	1
Volume Right	4	1	3	1
cSH	1592	1578	962	988
Volume to Capacity	0.00	0.00	0.01	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.2	0.3	8.8	8.6
Lane LOS	A	A	A	A
Approach Delay (s)	0.2	0.3	8.8	8.6
Approach LOS			A	A

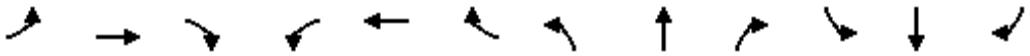
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	13.3%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	16	54	6	16	67	6
Future Volume (vph)	16	54	6	16	67	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	59	7	17	73	7

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	76	24	80
Volume Left (vph)	17	0	73
Volume Right (vph)	59	17	0
Hadj (s)	-0.39	-0.39	0.22
Departure Headway (s)	3.7	3.7	4.3
Degree Utilization, x	0.08	0.02	0.10
Capacity (veh/h)	933	927	820
Control Delay (s)	7.1	6.8	7.7
Approach Delay (s)	7.1	6.8	7.7
Approach LOS	A	A	A

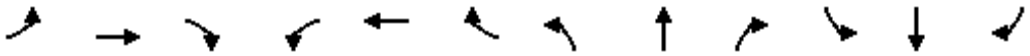
Intersection Summary			
Delay	7.3		
Level of Service	A		
Intersection Capacity Utilization	21.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	101	45	8	67	2	34	5	8	9	6	3
Future Volume (Veh/h)	2	101	45	8	67	2	34	5	8	9	6	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	110	49	9	73	2	37	5	9	10	7	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	75			159			237	232	134	242	255	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	75			159			237	232	134	242	255	74
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			95	99	99	99	99	100
cM capacity (veh/h)	1524			1420			705	663	914	697	644	988

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	161	84	51	20
Volume Left	2	9	37	10
Volume Right	49	2	9	3
cSH	1524	1420	730	708
Volume to Capacity	0.00	0.01	0.07	0.03
Queue Length 95th (ft)	0	0	6	2
Control Delay (s)	0.1	0.9	10.3	10.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.9	10.3	10.2
Approach LOS			B	B

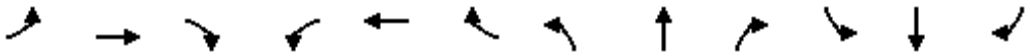
Intersection Summary				
Average Delay	2.6			
Intersection Capacity Utilization	19.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	116	7	5	72	10	2	3	14	4	4	3
Future Volume (Veh/h)	0	116	7	5	72	10	2	3	14	4	4	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	126	8	5	78	11	2	3	15	4	4	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	89			134			228	229	130	240	228	84
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			134			228	229	130	240	228	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	99	99	100
cM capacity (veh/h)	1506			1451			719	668	920	698	670	976

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	134	94	20	11
Volume Left	0	5	2	4
Volume Right	8	11	15	3
cSH	1506	1451	848	744
Volume to Capacity	0.00	0.00	0.02	0.01
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	0.4	9.3	9.9
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.4	9.3	9.9
Approach LOS			A	A

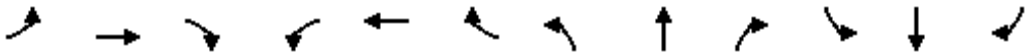
Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	18.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	69	45	35	32	17	57	269	32	40	295	11
Future Volume (vph)	24	69	45	35	32	17	57	269	32	40	295	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.96			0.97		1.00	0.98		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1765			1776		1770	3482		1770	3520	
Flt Permitted		0.92			0.86		0.95	1.00		0.55	1.00	
Satd. Flow (perm)		1643			1560		1770	3482		1032	3520	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	75	49	38	35	18	62	292	35	43	321	12
RTOR Reduction (vph)	0	20	0	0	11	0	0	10	0	0	2	0
Lane Group Flow (vph)	0	130	0	0	80	0	62	317	0	43	331	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		7.3			6.9		2.3	20.7		14.2	14.2	
Effective Green, g (s)		7.3			6.9		2.3	20.7		14.2	14.2	
Actuated g/C Ratio		0.19			0.18		0.06	0.55		0.38	0.38	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		318			286		108	1916		389	1329	
v/s Ratio Prot							c0.04	0.09			c0.09	
v/s Ratio Perm		c0.08			0.05					0.04		
v/c Ratio		0.41			0.28		0.57	0.17		0.11	0.25	
Uniform Delay, d1		13.3			13.2		17.2	4.2		7.6	8.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.9			0.6		4.5	0.0		0.1	0.1	
Delay (s)		14.1			13.9		21.7	4.2		7.7	8.1	
Level of Service		B			B		C	A		A	A	
Approach Delay (s)		14.1			13.9			7.0			8.1	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	37.6	Sum of lost time (s)	14.2
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

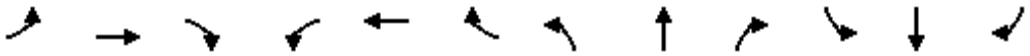
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	136	5	6	77	5	2	6	5	4	5	7
Future Volume (Veh/h)	6	136	5	6	77	5	2	6	5	4	5	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	148	5	7	84	5	2	7	5	4	5	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	89			153			276	268	150	274	268	86
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			153			276	268	150	274	268	86
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	99	99	99	99
cM capacity (veh/h)	1506			1428			662	632	896	665	632	972

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	160	96	14	17
Volume Left	7	7	2	4
Volume Right	5	5	5	8
cSH	1506	1428	712	767
Volume to Capacity	0.00	0.00	0.02	0.02
Queue Length 95th (ft)	0	0	2	2
Control Delay (s)	0.4	0.6	10.2	9.8
Lane LOS	A	A	B	A
Approach Delay (s)	0.4	0.6	10.2	9.8
Approach LOS			B	A

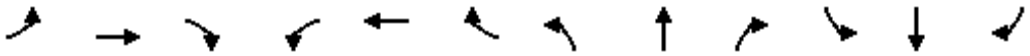
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	19.1%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	152	5	3	93	1	4	8	7	5	4	3
Future Volume (vph)	2	152	5	3	93	1	4	8	7	5	4	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	165	5	3	101	1	4	9	8	5	4	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	172	105	21	12
Volume Left (vph)	2	3	4	5
Volume Right (vph)	5	1	8	3
Hadj (s)	0.02	0.03	-0.16	-0.03
Departure Headway (s)	4.1	4.2	4.4	4.5
Degree Utilization, x	0.20	0.12	0.03	0.01
Capacity (veh/h)	864	846	770	741
Control Delay (s)	8.1	7.8	7.5	7.6
Approach Delay (s)	8.1	7.8	7.5	7.6
Approach LOS	A	A	A	A

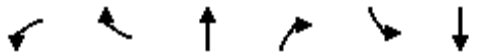
Intersection Summary				
Delay	7.9			
Level of Service	A			
Intersection Capacity Utilization	19.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	173	4	21	79	12	4	33	88	93	6	5
Future Volume (vph)	5	173	4	21	79	12	4	33	88	93	6	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	188	4	23	86	13	4	36	96	101	7	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	197	122	136	113
Volume Left (vph)	5	23	4	101
Volume Right (vph)	4	13	96	5
Hadj (s)	0.03	0.01	-0.38	0.19
Departure Headway (s)	4.7	4.8	4.5	5.0
Degree Utilization, x	0.26	0.16	0.17	0.16
Capacity (veh/h)	719	702	748	660
Control Delay (s)	9.3	8.7	8.4	9.0
Approach Delay (s)	9.3	8.7	8.4	9.0
Approach LOS	A	A	A	A

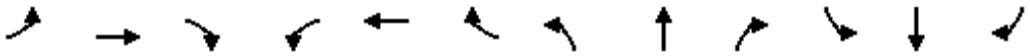
Intersection Summary			
Delay	8.9		
Level of Service	A		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	4	23	14	6	32	28
Future Volume (vph)	4	23	14	6	32	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	25	15	7	35	30

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	29	22	65
Volume Left (vph)	4	0	35
Volume Right (vph)	25	7	0
Hadj (s)	-0.46	-0.16	0.14
Departure Headway (s)	3.6	3.9	4.1
Degree Utilization, x	0.03	0.02	0.07
Capacity (veh/h)	963	909	863
Control Delay (s)	6.7	7.0	7.4
Approach Delay (s)	6.7	7.0	7.4
Approach LOS	A	A	A

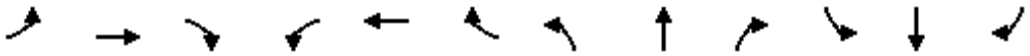
Intersection Summary			
Delay	7.2		
Level of Service	A		
Intersection Capacity Utilization	19.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	81	26	218	33	185	19	163	104	157	230	4
Future Volume (vph)	10	81	26	218	33	185	19	163	104	157	230	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1533		1785	1583	1770	3287		1770	3529	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1533		1785	1583	1770	3287		1770	3529	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	88	28	237	36	201	21	177	113	171	250	4
RTOR Reduction (vph)	0	0	26	0	0	167	0	89	0	0	1	0
Lane Group Flow (vph)	11	88	2	0	273	34	21	201	0	171	253	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	Over	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	5.2	5.2	5.2		15.0	10.8	1.6	13.8		10.8	23.0	
Effective Green, g (s)	5.2	5.2	5.2		15.0	10.8	1.6	13.8		10.8	23.0	
Actuated g/C Ratio	0.08	0.08	0.08		0.23	0.17	0.03	0.22		0.17	0.36	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	144	151	124		419	267	44	709		299	1270	
v/s Ratio Prot	0.01	c0.05			c0.15	0.02	0.01	c0.06		c0.10	0.07	
v/s Ratio Perm			0.00									
v/c Ratio	0.08	0.58	0.02		0.65	0.13	0.48	0.28		0.57	0.20	
Uniform Delay, d1	27.1	28.3	27.0		22.1	22.5	30.7	20.9		24.4	14.1	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	3.7	0.0		3.6	0.1	3.0	0.2		1.6	0.1	
Delay (s)	27.2	32.0	27.0		25.7	22.6	33.7	21.1		26.1	14.2	
Level of Service	C	C	C		C	C	C	C		C	B	
Approach Delay (s)		30.5			24.4			22.0			19.0	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	63.9	Sum of lost time (s)	19.1
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

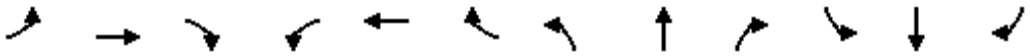
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	300	1	3	447	18	0	0	5	10	0	11
Future Volume (Veh/h)	3	300	1	3	447	18	0	0	5	10	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	326	1	3	486	20	0	0	5	11	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.98			0.98	0.98	0.98	0.98	0.98	
vC, conflicting volume	506			327			846	844	326	840	835	496
vC1, stage 1 conf vol							332	332		502	502	
vC2, stage 2 conf vol							514	512		338	333	
vCu, unblocked vol	506			304			834	831	303	826	822	496
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	98	100	98
cM capacity (veh/h)	1059			1233			468	470	722	480	475	574

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	330	509	5	23
Volume Left	3	3	0	11
Volume Right	1	20	5	12
cSH	1059	1233	722	525
Volume to Capacity	0.00	0.00	0.01	0.04
Queue Length 95th (ft)	0	0	1	3
Control Delay (s)	0.1	0.1	10.0	12.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.1	10.0	12.2
Approach LOS			B	B

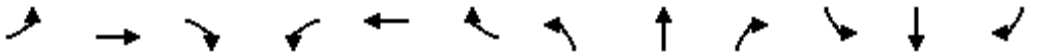
Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	41.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	315	2	6	496	10	2	1	13	12	1	6
Future Volume (Veh/h)	4	315	2	6	496	10	2	1	13	12	1	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	342	2	7	539	11	2	1	14	13	1	7
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked												
vC, conflicting volume	550			345			919	916	344	924	912	546
vC1, stage 1 conf vol							352	352		558	558	
vC2, stage 2 conf vol							567	564		366	353	
vCu, unblocked vol	550			345			919	916	344	924	912	546
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	98	97	100	99
cM capacity (veh/h)	1020			1213			438	444	698	441	446	537

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	348	557	17	21
Volume Left	4	7	2	13
Volume Right	2	11	14	7
cSH	1020	1213	633	469
Volume to Capacity	0.00	0.01	0.03	0.04
Queue Length 95th (ft)	0	0	2	4
Control Delay (s)	0.1	0.2	10.8	13.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.2	10.8	13.0
Approach LOS			B	B

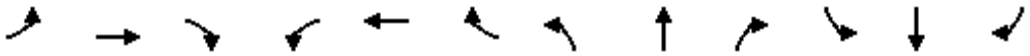
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	40.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	386	1	6	498	66	0	0	5	1	0	10
Future Volume (Veh/h)	14	386	1	6	498	66	0	0	5	1	0	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	420	1	7	541	72	0	0	5	1	0	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	613			421			1016	1078	420	1046	1042	577
vC1, stage 1 conf vol							450	450		591	591	
vC2, stage 2 conf vol							566	627		456	451	
vCu, unblocked vol	613			421			1016	1078	420	1046	1042	577
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			100	100	99	100	100	98
cM capacity (veh/h)	966			1138			406	394	633	405	411	516

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	436	7	613	5	12
Volume Left	15	7	0	0	1
Volume Right	1	0	72	5	11
cSH	966	1138	1700	633	505
Volume to Capacity	0.02	0.01	0.36	0.01	0.02
Queue Length 95th (ft)	1	0	0	1	2
Control Delay (s)	0.5	8.2	0.0	10.7	12.3
Lane LOS	A	A		B	B
Approach Delay (s)	0.5	0.1		10.7	12.3
Approach LOS				B	B

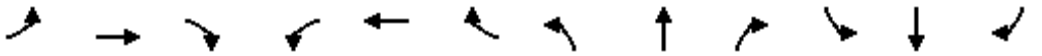
Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	33	5	0	5	14	222	4	7	502	5
Future Volume (Veh/h)	0	0	33	5	0	5	14	222	4	7	502	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	36	5	0	5	15	241	4	8	546	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked	0.92	0.92	0.92	0.92	0.92		0.92					
vC, conflicting volume	720	840	548	871	840	122	551			245		
vC1, stage 1 conf vol	564	564		273	273							
vC2, stage 2 conf vol	156	275		598	567							
vCu, unblocked vol	656	786	471	820	786	122	474			245		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	93	99	100	99	99			99		
cM capacity (veh/h)	462	456	499	386	447	906	1003			1318		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	36	10	15	161	84	8	551
Volume Left	0	5	15	0	0	8	0
Volume Right	36	5	0	0	4	0	5
cSH	499	541	1003	1700	1700	1318	1700
Volume to Capacity	0.07	0.02	0.01	0.09	0.05	0.01	0.32
Queue Length 95th (ft)	6	1	1	0	0	0	0
Control Delay (s)	12.8	11.8	8.6	0.0	0.0	7.7	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	12.8	11.8	0.5			0.1	
Approach LOS	B	B					

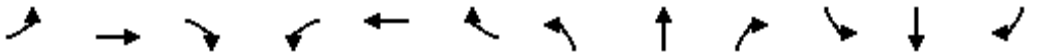
Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	43.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	7	23	30	9	5	14	301	4	4	295	17
Future Volume (vph)	48	7	23	30	9	5	14	301	4	4	295	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95			0.95	
Frt		1.00	0.85		1.00	0.85		1.00			0.99	
Flt Protected		0.96	1.00		0.96	1.00		1.00			1.00	
Satd. Flow (prot)		1785	1583		1794	1583		3525			3509	
Flt Permitted		0.72	1.00		0.74	1.00		0.94			0.95	
Satd. Flow (perm)		1349	1583		1372	1583		3315			3345	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	52	8	25	33	10	5	15	327	4	4	321	18
RTOR Reduction (vph)	0	0	23	0	0	5	0	0	0	0	2	0
Lane Group Flow (vph)	0	60	2	0	43	0	0	346	0	0	341	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		7.6	7.6		7.6	7.6		64.4			64.4	
Effective Green, g (s)		7.6	7.6		7.6	7.6		64.4			64.4	
Actuated g/C Ratio		0.09	0.09		0.09	0.09		0.81			0.81	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		128	150		130	150		2668			2692	
v/s Ratio Prot												
v/s Ratio Perm		c0.04	0.00		0.03	0.00		c0.10			0.10	
v/c Ratio		0.47	0.02		0.33	0.00		0.13			0.13	
Uniform Delay, d1		34.3	32.8		33.8	32.8		1.7			1.7	
Progression Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Incremental Delay, d2		2.7	0.0		1.5	0.0		0.1			0.1	
Delay (s)		37.0	32.9		35.3	32.8		1.8			1.8	
Level of Service		D	C		D	C		A			A	
Approach Delay (s)		35.8			35.1			1.8			1.8	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	35.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	258	103	163	362	295	1429	180	29	136	103	57	74
Future Volume (vph)	258	103	163	362	295	1429	180	29	136	103	57	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3030	1441		1786	1583		1805	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3030	1441		1786	1583		1805	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	280	112	177	393	321	1553	196	32	148	112	62	80
RTOR Reduction (vph)	0	0	150	0	500	573	0	0	114	0	0	65
Lane Group Flow (vph)	280	112	27	393	598	203	0	228	34	0	174	15
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.0	13.3	13.3	17.0	19.9	19.9		20.2	20.2		16.0	16.0
Effective Green, g (s)	14.0	13.3	13.3	17.0	19.9	19.9		20.2	20.2		16.0	16.0
Actuated g/C Ratio	0.16	0.15	0.15	0.19	0.23	0.23		0.23	0.23		0.18	0.18
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	283	283	241	344	690	328		413	366		330	290
v/s Ratio Prot	0.16	0.06		c0.22	c0.20			c0.13			c0.10	
v/s Ratio Perm			0.02			0.14			0.02			0.01
v/c Ratio	0.99	0.40	0.11	1.14	0.87	0.62		0.55	0.09		0.53	0.05
Uniform Delay, d1	36.6	33.4	31.9	35.1	32.4	30.3		29.6	26.4		32.2	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	50.0	0.3	0.1	93.0	10.7	2.4		5.2	0.5		5.9	0.3
Delay (s)	86.6	33.7	32.0	128.2	43.1	32.7		34.8	26.9		38.2	29.7
Level of Service	F	C	C	F	D	C		C	C		D	C
Approach Delay (s)		59.2			54.3			31.7			35.5	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	51.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	20.8
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	275	188	948	561	0	0
Future Volume (veh/h)	275	188	948	561	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863		
Adj Flow Rate, veh/h	299	204	1030	610		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1416	633	1377	3185		
Arrive On Green	0.40	0.40	0.40	0.90		
Sat Flow, veh/h	3632	1583	3442	3632		
Grp Volume(v), veh/h	299	204	1030	610		
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770		
Q Serve(g_s), s	2.2	3.5	10.3	0.8		
Cycle Q Clear(g_c), s	2.2	3.5	10.3	0.8		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1416	633	1377	3185		
V/C Ratio(X)	0.21	0.32	0.75	0.19		
Avail Cap(c_a), veh/h	1416	633	1377	3185		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	7.9	8.3	10.3	0.2		
Incr Delay (d2), s/veh	0.3	1.3	3.8	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.1	1.8	5.4	0.4		
LnGrp Delay(d),s/veh	8.2	9.6	14.0	0.4		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	503			1640		
Approach Delay, s/veh	8.8			9.0		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			20.0	20.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s			12.3	5.5				2.8
Green Ext Time (p_c), s			1.6	1.9				4.7

Intersection Summary	
HCM 2010 Ctrl Delay	8.9
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	466	79	980	1434	79	1
Future Volume (veh/h)	466	79	980	1434	79	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	507	86	1065	1559	86	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	871	390	1112	2232	437	390
Arrive On Green	0.25	0.25	0.32	0.63	0.25	0.00
Sat Flow, veh/h	3632	1583	3442	3632	1774	1583
Grp Volume(v), veh/h	507	86	1065	1559	86	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770	1774	1583
Q Serve(g_s), s	8.2	2.8	19.7	18.9	2.5	0.0
Cycle Q Clear(g_c), s	8.2	2.8	19.7	18.9	2.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	871	390	1112	2232	437	390
V/C Ratio(X)	0.58	0.22	0.96	0.70	0.20	0.00
Avail Cap(c_a), veh/h	871	390	1112	2232	437	390
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.6	19.5	21.6	7.9	19.4	0.0
Incr Delay (d2), s/veh	2.8	1.3	18.6	1.8	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	1.4	12.2	9.7	1.3	0.0
LnGrp Delay(d),s/veh	24.4	20.8	40.1	9.8	20.4	0.0
LnGrp LOS	C	C	D	A	C	
Approach Vol, veh/h	593			2624	86	
Approach Delay, s/veh	23.9			22.1	20.4	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	25.0	20.0				45.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	21.0	16.0				41.0
Max Q Clear Time (g_c+I1), s		4.5	21.7	10.2				20.9
Green Ext Time (p_c), s		0.1	0.0	1.8				12.2

Intersection Summary	
HCM 2010 Ctrl Delay	22.4
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	502	6	183	871	718	17	0	219	90	71	82
Future Volume (veh/h)	0	502	6	183	871	718	17	0	219	90	71	82
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	1863	1863	0	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	546	7	199	947	0	18	0	238	88	92	89
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1101	14	273	1906	853	0	0	0	546	573	487
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3672	46	1774	3539	1583		0		1774	1863	1583
Grp Volume(v), veh/h	0	270	283	199	947	0		0.0		88	92	89
Grp Sat Flow(s),veh/h/ln	0	1770	1855	1774	1770	1583				1774	1863	1583
Q Serve(g_s), s	0.0	6.5	6.5	5.6	8.8	0.0				1.9	1.9	2.1
Cycle Q Clear(g_c), s	0.0	6.5	6.5	5.6	8.8	0.0				1.9	1.9	2.1
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	544	571	273	1906	853				546	573	487
V/C Ratio(X)	0.00	0.50	0.50	0.73	0.50	0.00				0.16	0.16	0.18
Avail Cap(c_a), veh/h	0	544	571	273	1906	853				546	573	487
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	14.7	14.7	21.0	7.6	0.0				13.1	13.1	13.2
Incr Delay (d2), s/veh	0.0	3.2	3.1	15.7	0.9	0.0				0.6	0.6	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.6	3.8	3.9	4.5	0.0				1.0	1.0	1.1
LnGrp Delay(d),s/veh	0.0	17.9	17.8	36.7	8.5	0.0				13.7	13.7	14.0
LnGrp LOS		B	B	D	A					B	B	B
Approach Vol, veh/h		553			1146						269	
Approach Delay, s/veh		17.8			13.4						13.8	
Approach LOS		B			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			7.6	8.5		4.1		10.8
Green Ext Time (p_c), s			0.0	2.0		0.8		6.4

Intersection Summary	
HCM 2010 Ctrl Delay	14.7
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	325	393	13	22	517	506	24	29	48	197	5	80
Future Volume (veh/h)	325	393	13	22	517	506	24	29	48	197	5	80
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	353	427	14	24	562	550	26	32	52	153	90	87
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	355	1180	39	111	708	633	163	201	317	355	174	169
Arrive On Green	0.20	0.34	0.34	0.06	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1774	3498	114	1774	3539	1583	817	1005	1583	1774	872	843
Grp Volume(v), veh/h	353	216	225	24	562	550	58	0	52	153	0	177
Grp Sat Flow(s),veh/h/ln	1774	1770	1843	1774	1770	1583	1822	0	1583	1774	0	1714
Q Serve(g_s), s	15.9	7.4	7.4	1.0	12.1	16.0	2.1	0.0	2.2	6.0	0.0	7.4
Cycle Q Clear(g_c), s	15.9	7.4	7.4	1.0	12.1	16.0	2.1	0.0	2.2	6.0	0.0	7.4
Prop In Lane	1.00		0.06	1.00		1.00	0.45		1.00	1.00		0.49
Lane Grp Cap(c), veh/h	355	597	622	111	708	633	364	0	317	355	0	343
V/C Ratio(X)	0.99	0.36	0.36	0.22	0.79	0.87	0.16	0.00	0.16	0.43	0.00	0.52
Avail Cap(c_a), veh/h	355	597	622	111	708	633	364	0	317	355	0	343
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.0	20.0	20.0	35.6	30.4	19.2	26.4	0.0	26.5	28.0	0.0	28.5
Incr Delay (d2), s/veh	46.5	1.7	1.6	4.4	8.9	15.0	0.9	0.0	1.1	3.8	0.0	5.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.3	3.9	4.0	0.6	6.7	14.7	1.2	0.0	1.1	3.3	0.0	4.0
LnGrp Delay(d),s/veh	78.5	21.7	21.6	40.1	39.4	34.2	27.4	0.0	27.6	31.8	0.0	34.0
LnGrp LOS	E	C	C	D	D	C	C		C	C		C
Approach Vol, veh/h		794			1136			110			330	
Approach Delay, s/veh		46.9			36.9			27.5			33.0	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	31.0		20.0	20.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	27.0		16.0	16.0	16.0
Max Q Clear Time (g_c+I1), s		4.2	3.0	9.4		9.4	17.9	18.0
Green Ext Time (p_c), s		0.3	0.0	2.4		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	39.3
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	378	143	43	748	257	127	74	41	316	155	223
Future Volume (veh/h)	86	378	143	43	748	257	127	74	41	316	155	223
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	93	411	155	47	813	279	109	121	45	256	290	242
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	101	613	229	101	860	385	431	452	385	405	426	362
Arrive On Green	0.06	0.24	0.24	0.06	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23
Sat Flow, veh/h	1774	2525	942	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	93	287	279	47	813	279	109	121	45	256	290	242
Grp Sat Flow(s),veh/h/ln	1774	1770	1697	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.7	10.2	10.4	1.8	15.8	11.3	3.5	3.7	1.6	9.1	10.0	9.7
Cycle Q Clear(g_c), s	3.7	10.2	10.4	1.8	15.8	11.3	3.5	3.7	1.6	9.1	10.0	9.7
Prop In Lane	1.00		0.56	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	101	430	412	101	860	385	431	452	385	405	426	362
V/C Ratio(X)	0.92	0.67	0.68	0.46	0.95	0.73	0.25	0.27	0.12	0.63	0.68	0.67
Avail Cap(c_a), veh/h	101	430	412	101	860	385	431	452	385	405	426	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.8	23.9	24.0	32.0	26.0	24.4	21.4	21.5	20.7	24.3	24.7	24.6
Incr Delay (d2), s/veh	69.0	8.0	8.7	14.5	20.1	11.3	1.4	1.4	0.6	7.3	8.5	9.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	6.0	5.9	1.3	10.1	6.2	1.9	2.1	0.7	5.2	6.1	5.2
LnGrp Delay(d),s/veh	101.9	31.9	32.7	46.4	46.1	35.7	22.8	22.9	21.3	31.6	33.2	34.0
LnGrp LOS	F	C	C	D	D	D	C	C	C	C	C	C
Approach Vol, veh/h		659			1139			275			788	
Approach Delay, s/veh		42.1			43.6			22.6			32.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	8.0	21.0		20.0	8.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	17.0		16.0	4.0	17.0
Max Q Clear Time (g_c+I1), s		5.7	3.8	12.4		12.0	5.7	17.8
Green Ext Time (p_c), s		0.8	0.0	1.4		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	38.3
HCM 2010 LOS	D

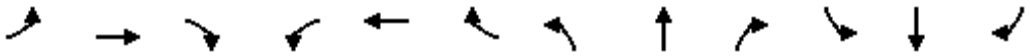
Notes

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	43	93	13	62	70	165	3	84	22	0	0	0
Future Vol, veh/h	43	93	13	62	70	165	3	84	22	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	101	14	67	76	179	3	91	24	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

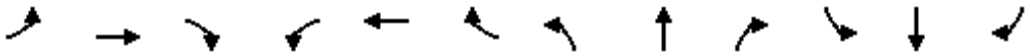
Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.8	9.5	8.8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	3%	29%	21%
Vol Thru, %	77%	62%	24%
Vol Right, %	20%	9%	56%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	109	149	297
LT Vol	3	43	62
Through Vol	84	93	70
RT Vol	22	13	165
Lane Flow Rate	118	162	323
Geometry Grp	1	1	1
Degree of Util (X)	0.16	0.205	0.369
Departure Headway (Hd)	4.852	4.559	4.119
Convergence, Y/N	Yes	Yes	Yes
Cap	738	787	875
Service Time	2.887	2.588	2.141
HCM Lane V/C Ratio	0.16	0.206	0.369
HCM Control Delay	8.8	8.8	9.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.6	0.8	1.7



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	5	526	0	205	5	280	536	353	359	2
Future Volume (vph)	0	0	5	526	0	205	5	280	536	353	359	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6		4.6	4.6	4.0		4.6	4.0		4.6	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95	1.00		0.95	
Frt		0.86		1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00		0.95	0.95	1.00		1.00	1.00		0.98	
Satd. Flow (prot)		1611		1681	1681	1583		3536	1583		3452	
Flt Permitted		1.00		0.95	0.95	1.00		1.00	1.00		0.98	
Satd. Flow (perm)		1611		1681	1681	1583		3536	1583		3452	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	5	572	0	223	5	304	583	384	390	2
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	286	286	223	0	309	583	0	776	0
Turn Type		NA		Split	NA	Free	Split	NA	Free	Split	NA	
Protected Phases		4		8	8		2	2		6	6	
Permitted Phases	4					Free			Free			
Actuated Green, G (s)		1.0		10.4	10.4	66.0		18.1	66.0		18.1	
Effective Green, g (s)		1.0		10.4	10.4	66.0		18.1	66.0		18.1	
Actuated g/C Ratio		0.02		0.16	0.16	1.00		0.27	1.00		0.27	
Clearance Time (s)		4.6		4.6	4.6			4.6			4.6	
Vehicle Extension (s)		3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		24		264	264	1583		969	1583		946	
v/s Ratio Prot		0.00		c0.17	0.17			0.09			c0.22	
v/s Ratio Perm						0.14			c0.37			
v/c Ratio		0.00		1.08	1.08	0.14		0.32	0.37		0.82	
Uniform Delay, d1		32.0		27.8	27.8	0.0		19.0	0.0		22.4	
Progression Factor		1.00		1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.1		79.4	79.4	0.2		0.9	0.7		7.9	
Delay (s)		32.1		107.2	107.2	0.2		19.9	0.7		30.3	
Level of Service		C		F	F	A		B	A		C	
Approach Delay (s)		32.1			77.2			7.3			30.3	
Approach LOS		C			E			A			C	

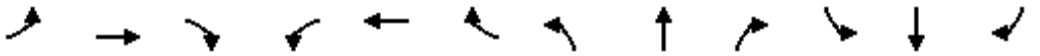
Intersection Summary			
HCM 2000 Control Delay	37.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	66.0	Sum of lost time (s)	18.4
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		
Description: SR-76 & Coast Hwy			
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	38	26	62	65	100	41	78	65	115	106	25
Future Volume (vph)	1	38	26	62	65	100	41	78	65	115	106	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	41	28	67	71	109	45	85	71	125	115	27

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	70	247	201	267
Volume Left (vph)	1	67	45	125
Volume Right (vph)	28	109	71	27
Hadj (s)	-0.20	-0.18	-0.13	0.07
Departure Headway (s)	5.3	5.0	5.0	5.1
Degree Utilization, x	0.10	0.35	0.28	0.38
Capacity (veh/h)	592	658	668	662
Control Delay (s)	8.9	10.7	9.9	11.2
Approach Delay (s)	8.9	10.7	9.9	11.2
Approach LOS	A	B	A	B

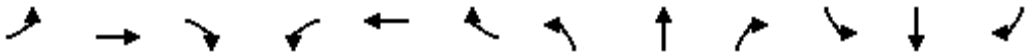
Intersection Summary				
Delay	10.5			
Level of Service	B			
Intersection Capacity Utilization	52.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	162	50	68	11	44	27	48	554	17	43	560	117
Future Volume (vph)	162	50	68	11	44	27	48	554	17	43	560	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.96		1.00	1.00		1.00	0.97	
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1794	1583		1769		1770	3524		1770	3448	
Flt Permitted		0.79	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1474	1583		1720		1770	3524		1770	3448	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	54	74	12	48	29	52	602	18	47	609	127
RTOR Reduction (vph)	0	0	51	0	20	0	0	3	0	0	18	0
Lane Group Flow (vph)	0	230	23	0	69	0	52	617	0	47	718	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		17.6	17.6		17.6		5.4	17.3		10.2	26.9	
Effective Green, g (s)		17.6	17.6		17.6		5.4	17.3		10.2	26.9	
Actuated g/C Ratio		0.31	0.31		0.31		0.10	0.31		0.18	0.48	
Clearance Time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		3.0	7.0	
Lane Grp Cap (vph)		464	498		541		170	1090		322	1659	
v/s Ratio Prot							c0.03	c0.18		0.03	c0.21	
v/s Ratio Perm		c0.16	0.01		0.04							
v/c Ratio		0.50	0.05		0.13		0.31	0.57		0.15	0.43	
Uniform Delay, d1		15.5	13.3		13.7		23.5	16.2		19.2	9.5	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.9	0.1		0.4		1.0	0.7		0.2	0.6	
Delay (s)		18.5	13.5		14.1		24.5	16.8		19.4	10.1	
Level of Service		B	B		B		C	B		B	B	
Approach Delay (s)		17.3			14.1			17.4			10.7	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	55.9	Sum of lost time (s)	10.8
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

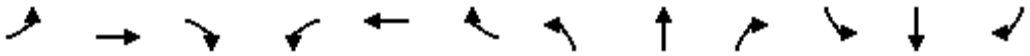
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	29	23	29	34	65	19	548	53	36	572	22
Future Volume (vph)	26	29	23	29	34	65	19	548	53	36	572	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frt	1.00	0.93		1.00	0.90			0.99			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1740		1770	1679			3488			3511	
Flt Permitted	0.69	1.00		0.72	1.00			0.92			0.89	
Satd. Flow (perm)	1280	1740		1341	1679			3224			3123	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	28	32	25	32	37	71	21	596	58	39	622	24
RTOR Reduction (vph)	0	12	0	0	35	0	0	13	0	0	5	0
Lane Group Flow (vph)	28	45	0	32	73	0	0	662	0	0	680	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	25.9	25.9		25.9	25.9			16.8			16.8	
Effective Green, g (s)	25.9	25.9		25.9	25.9			16.8			16.8	
Actuated g/C Ratio	0.50	0.50		0.50	0.50			0.33			0.33	
Clearance Time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	643	875		674	844			1051			1018	
v/s Ratio Prot		0.03			c0.04							
v/s Ratio Perm	0.02			0.02				0.21			c0.22	
v/c Ratio	0.04	0.05		0.05	0.09			0.63			0.67	
Uniform Delay, d1	6.5	6.5		6.5	6.7			14.7			14.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.1	0.1		0.1	0.2			1.4			1.8	
Delay (s)	6.6	6.6		6.7	6.9			16.1			16.8	
Level of Service	A	A		A	A			B			B	
Approach Delay (s)		6.6			6.8			16.1			16.8	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	51.5	Sum of lost time (s)	8.8
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

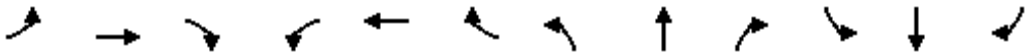
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	30	42	18	30	51	32	531	42	23	531	72
Future Volume (vph)	38	30	42	18	30	51	32	531	42	23	531	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00			1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00			1.00	
Frt	1.00	0.91		1.00	0.91			0.99			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1746	1678		1754	1659			3485			3457	
Flt Permitted	0.70	1.00		0.71	1.00			0.88			0.92	
Satd. Flow (perm)	1286	1678		1303	1659			3072			3174	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	33	46	20	33	55	35	577	46	25	577	78
RTOR Reduction (vph)	0	22	0	0	27	0	0	10	0	0	19	0
Lane Group Flow (vph)	41	57	0	20	61	0	0	648	0	0	661	0
Confl. Peds. (#/hr)	16		11	11		16	10		17	17		10
Confl. Bikes (#/hr)			2			2						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	27.9	27.9		27.1	27.1			16.0			16.5	
Effective Green, g (s)	27.9	27.9		27.1	27.1			16.0			16.5	
Actuated g/C Ratio	0.53	0.53		0.51	0.51			0.30			0.31	
Clearance Time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Vehicle Extension (s)	3.0	3.0		3.5	3.5			3.0			3.5	
Lane Grp Cap (vph)	675	881		664	846			925			986	
v/s Ratio Prot		0.03			c0.04							
v/s Ratio Perm	0.03			0.02				c0.21			0.21	
v/c Ratio	0.06	0.06		0.03	0.07			0.70			0.67	
Uniform Delay, d1	6.2	6.2		6.5	6.6			16.4			15.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.2	0.1		0.1	0.2			2.4			1.9	
Delay (s)	6.3	6.3		6.5	6.8			18.8			17.8	
Level of Service	A	A		A	A			B			B	
Approach Delay (s)		6.3			6.7			18.8			17.8	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	53.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

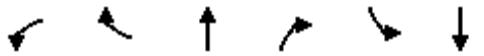
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	32	13	116	107	13	18	40	250	50	18	225	10
Future Volume (vph)	32	13	116	107	13	18	40	250	50	18	225	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	14	126	116	14	20	43	272	54	20	245	11

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	49	126	150	369	276
Volume Left (vph)	35	0	116	43	20
Volume Right (vph)	0	126	20	54	11
Hadj (s)	0.39	-0.67	0.11	-0.03	0.02
Departure Headway (s)	6.9	5.9	6.2	5.3	5.5
Degree Utilization, x	0.09	0.21	0.26	0.54	0.42
Capacity (veh/h)	464	543	511	640	612
Control Delay (s)	9.5	9.2	11.4	14.5	12.5
Approach Delay (s)	9.3		11.4	14.5	12.5
Approach LOS	A		B	B	B

Intersection Summary				
Delay	12.5			
Level of Service	B			
Intersection Capacity Utilization	49.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	181	81	106	126	59	124
Future Volume (vph)	181	81	106	126	59	124
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	197	88	115	137	64	135

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	197	88	252	199
Volume Left (vph)	197	0	0	64
Volume Right (vph)	0	88	137	0
Hadj (s)	0.53	-0.67	-0.29	0.10
Departure Headway (s)	6.1	4.9	4.7	5.1
Degree Utilization, x	0.34	0.12	0.33	0.28
Capacity (veh/h)	555	684	732	665
Control Delay (s)	11.0	7.4	9.9	10.1
Approach Delay (s)	9.9		9.9	10.1
Approach LOS	A		A	B

Intersection Summary			
Delay	10.0		
Level of Service	A		
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Year 2013 No Project

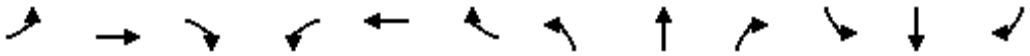
Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #9 Cleveland Street and Mission Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.292
Loss Time (sec):	0	Average Delay (sec/veh):	10.6
Optimal Cycle:	0	Level Of Service:	B

Street Name:	Cleveland Street						Mission Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1 0	0 1		0 0 1!	0 0		1 0 1	1 0		1 0 1	1 0	
Volume Module:												
Base Vol:	43	38	58	72	29	59	28	224	33	93	204	63
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	43	38	58	72	29	59	28	224	33	93	204	63
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	43	38	58	72	29	59	28	224	33	93	204	63
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	43	38	58	72	29	59	28	224	33	93	204	63
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	43	38	58	72	29	59	28	224	33	93	204	63
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.53	0.47	1.00	0.45	0.18	0.37	1.00	1.74	0.26	1.00	1.53	0.47
Final Sat.:	268	237	584	247	99	202	504	961	144	519	872	279
Capacity Analysis Module:												
Vol/Sat:	0.16	0.16	0.10	0.29	0.29	0.29	0.06	0.23	0.23	0.18	0.23	0.23
Crit Moves:	****			****			****			****		
Delay/Veh:	10.6	10.6	9.0	11.6	11.6	11.6	9.9	10.7	10.5	10.7	10.5	10.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	10.6	10.6	9.0	11.6	11.6	11.6	9.9	10.7	10.5	10.7	10.5	10.1
LOS by Move:	B	B	A	B	B	B	A	B	B	B	B	B
ApproachDel:	9.9			11.6			10.6			10.5		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	9.9			11.6			10.6			10.5		
LOS by Appr:	A			B			B			B		
AllWayAvgQ:	0.2	0.2	0.1	0.4	0.4	0.4	0.1	0.3	0.3	0.2	0.3	0.3

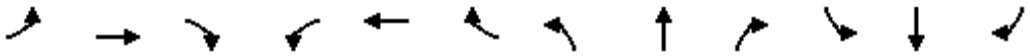
Note: Queue reported is the number of cars per lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	0	65	137	380	121	53	507	0	0	426	61
Future Volume (vph)	43	0	65	137	380	121	53	507	0	0	426	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	
Lane Util. Factor	1.00		1.00	1.00	0.95		1.00	0.95			0.95	
Frpb, ped/bikes	1.00		0.98	1.00	0.99		1.00	1.00			1.00	
Flpb, ped/bikes	1.00		1.00	0.99	1.00		1.00	1.00			1.00	
Frt	1.00		0.85	1.00	0.96		1.00	1.00			0.98	
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)	1761		1547	1751	3393		1770	3539			3460	
Flt Permitted	0.45		1.00	0.95	1.00		0.38	1.00			1.00	
Satd. Flow (perm)	831		1547	1751	3393		710	3539			3460	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	0	71	149	413	132	58	551	0	0	463	66
RTOR Reduction (vph)	0	0	32	0	26	0	0	0	0	0	19	0
Lane Group Flow (vph)	47	0	39	149	519	0	58	551	0	0	510	0
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type	Perm		Perm	Perm	NA		Perm	NA			NA	
Protected Phases					8			2			6	
Permitted Phases	4		4	8			2					
Actuated Green, G (s)	32.1		32.1	32.1	32.1		16.6	16.6			16.6	
Effective Green, g (s)	32.1		32.1	32.1	32.1		16.6	16.6			16.6	
Actuated g/C Ratio	0.55		0.55	0.55	0.55		0.28	0.28			0.28	
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0		4.0	4.0			4.0	
Lane Grp Cap (vph)	454		845	957	1855		200	1000			978	
v/s Ratio Prot					c0.15			c0.16			0.15	
v/s Ratio Perm	0.06		0.03	0.09			0.08					
v/c Ratio	0.10		0.05	0.16	0.28		0.29	0.55			0.52	
Uniform Delay, d1	6.4		6.2	6.6	7.1		16.4	17.9			17.7	
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.5		0.1	0.3	0.4		1.1	0.8			0.7	
Delay (s)	6.8		6.3	6.9	7.5		17.5	18.7			18.4	
Level of Service	A		A	A	A		B	B			B	
Approach Delay (s)		6.5			7.4			18.6			18.4	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	58.7	Sum of lost time (s)	10.0
Intersection Capacity Utilization	57.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	351	3	142	638	268	5	44	477	365	51	25
Future Volume (vph)	15	351	3	142	638	268	5	44	477	365	51	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.86		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	
Satd. Flow (prot)	1770	3535		1770	3539	1583	1770	1607		1681	1684	
Flt Permitted	0.24	1.00		0.47	1.00	1.00	0.59	1.00		0.34	0.44	
Satd. Flow (perm)	455	3535		880	3539	1583	1099	1607		610	765	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	382	3	154	693	291	5	48	518	397	55	27
RTOR Reduction (vph)	0	1	0	0	0	203	0	188	0	0	3	0
Lane Group Flow (vph)	16	384	0	154	693	88	5	378	0	238	238	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	24.4	24.4		24.0	24.0	24.0	45.6	45.6		45.6	45.6	
Effective Green, g (s)	24.4	24.4		24.0	24.0	24.0	45.6	45.6		45.6	45.6	
Actuated g/C Ratio	0.31	0.31		0.30	0.30	0.30	0.58	0.58		0.58	0.58	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	140	1089		266	1072	479	632	925		351	440	
v/s Ratio Prot		0.11			c0.20			0.24				
v/s Ratio Perm	0.04			0.17		0.06	0.00			c0.39	0.31	
v/c Ratio	0.11	0.35		0.58	0.65	0.18	0.01	0.41		0.68	0.54	
Uniform Delay, d1	19.7	21.3		23.3	23.9	20.4	7.2	9.3		11.7	10.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.3		3.3	1.4	0.2	0.0	0.4		5.6	1.7	
Delay (s)	20.1	21.5		26.6	25.3	20.6	7.2	9.7		17.3	12.1	
Level of Service	C	C		C	C	C	A	A		B	B	
Approach Delay (s)		21.5			24.3			9.7			14.7	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	18.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	79.2	Sum of lost time (s)	9.6
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

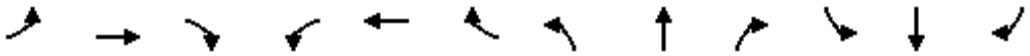
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	177	32	50	126	50	63
Future Volume (Veh/h)	177	32	50	126	50	63
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	192	35	54	137	54	68
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			227		454	210
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			227		454	210
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		90	92
cM capacity (veh/h)			1341		541	831

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	227	191	122
Volume Left	0	54	54
Volume Right	35	0	68
cSH	1700	1341	671
Volume to Capacity	0.13	0.04	0.18
Queue Length 95th (ft)	0	3	16
Control Delay (s)	0.0	2.4	11.5
Lane LOS		A	B
Approach Delay (s)	0.0	2.4	11.5
Approach LOS			B

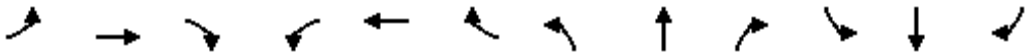
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	365	67	0	0	0	58	651	245	113	479	62
Future Volume (vph)	70	365	67	0	0	0	58	651	245	113	479	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00					1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00					1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00					1.00	1.00		1.00	1.00	
Frt	1.00	0.98					1.00	0.96		1.00	0.98	
Flt Protected	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1811					1770	3377		1770	3463	
Flt Permitted	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1811					1770	3377		1770	3463	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	397	73	0	0	0	63	708	266	123	521	67
RTOR Reduction (vph)	0	12	0	0	0	0	0	76	0	0	19	0
Lane Group Flow (vph)	76	458	0	0	0	0	63	898	0	123	569	0
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA		Prot	NA	
Protected Phases	4	4					5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	18.1	18.1					4.0	15.8		3.8	15.6	
Effective Green, g (s)	18.1	18.1					4.0	15.8		3.8	15.6	
Actuated g/C Ratio	0.36	0.36					0.08	0.31		0.07	0.31	
Clearance Time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0					3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	631	646					139	1052		132	1065	
v/s Ratio Prot	0.04	c0.25					0.04	c0.27		c0.07	0.16	
v/s Ratio Perm												
v/c Ratio	0.12	0.71					0.45	0.85		0.93	0.53	
Uniform Delay, d1	11.0	14.0					22.3	16.4		23.3	14.5	
Progression Factor	1.00	1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	6.5					10.3	7.1		61.8	0.7	
Delay (s)	11.3	20.5					32.6	23.5		85.1	15.2	
Level of Service	B	C					C	C		F	B	
Approach Delay (s)		19.2			0.0			24.0			27.3	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	50.7	Sum of lost time (s)	13.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

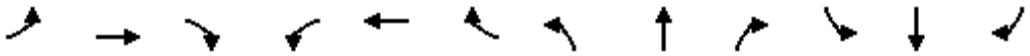
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	677	14	0	0	0	0	8	33	24	18	0
Future Volume (Veh/h)	15	677	14	0	0	0	0	8	33	24	18	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	736	15	0	0	0	0	9	36	26	20	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			751			786	776	376	440	783	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			751			786	776	376	440	783	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	94	94	100
cM capacity (veh/h)	1622			854			267	324	622	458	321	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	384	383	45	46
Volume Left	16	0	0	26
Volume Right	0	15	36	0
cSH	1622	1700	525	386
Volume to Capacity	0.01	0.23	0.09	0.12
Queue Length 95th (ft)	1	0	7	10
Control Delay (s)	0.4	0.0	12.5	15.6
Lane LOS	A		B	C
Approach Delay (s)	0.2		12.5	15.6
Approach LOS			B	C

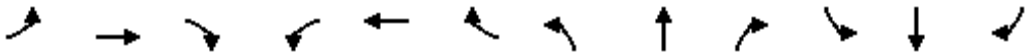
Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	35.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	26	692	16	0	0	0	0	20	34	33	42	0
Future Volume (vph)	26	692	16	0	0	0	0	20	34	33	42	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	752	17	0	0	0	0	22	37	36	46	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	404	393	59	82
Volume Left (vph)	28	0	0	36
Volume Right (vph)	0	17	37	0
Hadj (s)	0.07	0.00	-0.34	0.12
Departure Headway (s)	5.0	4.9	5.2	5.6
Degree Utilization, x	0.56	0.54	0.09	0.13
Capacity (veh/h)	708	724	646	598
Control Delay (s)	12.9	12.2	8.7	9.5
Approach Delay (s)	12.5		8.7	9.5
Approach LOS	B		A	A

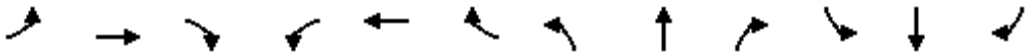
Intersection Summary				
Delay	12.0			
Level of Service	B			
Intersection Capacity Utilization	37.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	377	405	19	6	0	4	0	7	7	0	0	0
Future Volume (vph)	377	405	19	6	0	4	0	7	7	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	410	440	21	7	0	4	0	8	8	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	410	461	11	16
Volume Left (vph)	410	0	7	0
Volume Right (vph)	0	21	4	8
Hadj (s)	0.53	0.00	-0.06	-0.27
Departure Headway (s)	5.1	4.6	4.7	5.2
Degree Utilization, x	0.58	0.58	0.01	0.02
Capacity (veh/h)	704	785	753	652
Control Delay (s)	13.7	12.5	7.7	8.3
Approach Delay (s)	13.1		7.7	8.3
Approach LOS	B		A	A

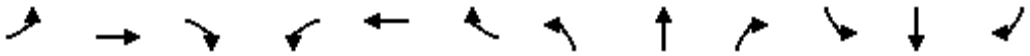
Intersection Summary			
Delay	12.9		
Level of Service	B		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	2	37	11	5	11	16	644	16	8	589	17
Future Volume (Veh/h)	11	2	37	11	5	11	16	644	16	8	589	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	2	40	12	5	12	17	700	17	9	640	18
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			400	
pX, platoon unblocked	0.96	0.96	0.96	0.96	0.96		0.96					
vC, conflicting volume	1074	1432	336	1128	1432	366	665			724		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	989	1363	219	1046	1363	366	562			724		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	99	95	92	96	98	98			99		
cM capacity (veh/h)	177	135	748	158	135	626	957			869		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	54	29	367	367	329	338
Volume Left	12	12	17	0	9	0
Volume Right	40	12	0	17	0	18
cSH	397	219	957	1700	869	1700
Volume to Capacity	0.14	0.13	0.02	0.22	0.01	0.20
Queue Length 95th (ft)	12	11	1	0	1	0
Control Delay (s)	15.5	23.9	0.6	0.0	0.4	0.0
Lane LOS	C	C	A		A	
Approach Delay (s)	15.5	23.9	0.3		0.2	
Approach LOS	C	C				

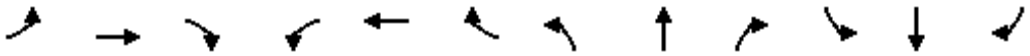
Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	40.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	20	10	0	9	13	665	14	18	604	17
Future Volume (Veh/h)	4	0	20	10	0	9	13	665	14	18	604	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	22	11	0	10	14	723	15	20	657	18
Pedestrians		11			7						12	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								831			830	
pX, platoon unblocked	0.98	0.98		0.98	0.98	0.98				0.98		
vC, conflicting volume	1128	1490	348	1156	1492	388	686			745		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1084	1454	348	1112	1455	325	686			691		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	97	93	100	98	98			98		
cM capacity (veh/h)	155	119	642	147	119	644	895			874		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	26	21	376	376	348	346
Volume Left	4	11	14	0	20	0
Volume Right	22	10	0	15	0	18
cSH	433	233	895	1700	874	1700
Volume to Capacity	0.06	0.09	0.02	0.22	0.02	0.20
Queue Length 95th (ft)	5	7	1	0	2	0
Control Delay (s)	13.8	22.0	0.5	0.0	0.8	0.0
Lane LOS	B	C	A		A	
Approach Delay (s)	13.8	22.0	0.3		0.4	
Approach LOS	B	C				

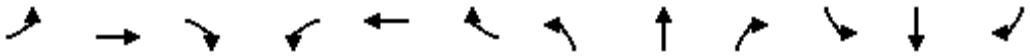
Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	43.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	57	85	49	45	7	58	7	130	36	69	80	3
Future Volume (vph)	57	85	49	45	7	58	7	130	36	69	80	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	92	53	49	8	63	8	141	39	75	87	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	207	120	188	165
Volume Left (vph)	62	49	8	75
Volume Right (vph)	53	63	39	3
Hadj (s)	-0.06	-0.20	-0.08	0.11
Departure Headway (s)	4.9	4.9	4.9	5.1
Degree Utilization, x	0.28	0.16	0.26	0.23
Capacity (veh/h)	679	666	684	651
Control Delay (s)	9.8	8.9	9.5	9.7
Approach Delay (s)	9.8	8.9	9.5	9.7
Approach LOS	A	A	A	A

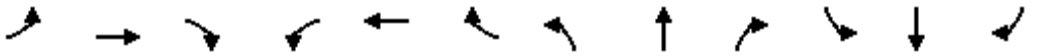
Intersection Summary				
Delay	9.5			
Level of Service	A			
Intersection Capacity Utilization	40.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	207	20	9	144	24	19	33	31	19	44	9
Future Volume (Veh/h)	8	207	20	9	144	24	19	33	31	19	44	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	225	22	10	157	26	21	36	34	21	48	10
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	197			254			486	478	243	510	476	185
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	197			254			486	478	243	510	476	185
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			95	92	96	95	90	99
cM capacity (veh/h)	1360			1303			435	471	791	412	472	847

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	256	193	91	79
Volume Left	9	10	21	21
Volume Right	22	26	34	10
cSH	1360	1303	543	481
Volume to Capacity	0.01	0.01	0.17	0.16
Queue Length 95th (ft)	0	1	15	15
Control Delay (s)	0.3	0.5	13.0	14.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.5	13.0	14.0
Approach LOS			B	B

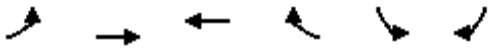
Intersection Summary				
Average Delay	4.0			
Intersection Capacity Utilization	27.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	69	61	123	57	49	10	108	582	62	11	582	34
Future Volume (vph)	69	61	123	57	49	10	108	582	62	11	582	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90			0.99		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1676			1797		1770	3488		1770	3510	
Flt Permitted	0.75	1.00			0.75		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1398	1676			1377		1770	3488		1770	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	66	134	62	53	11	117	633	67	12	633	37
RTOR Reduction (vph)	0	81	0	0	4	0	0	8	0	0	4	0
Lane Group Flow (vph)	75	119	0	0	122	0	117	692	0	12	666	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	10.4	10.4			10.4		7.2	25.5		0.8	19.1	
Effective Green, g (s)	10.4	10.4			10.4		7.2	25.5		0.8	19.1	
Actuated g/C Ratio	0.21	0.21			0.21		0.14	0.51		0.02	0.38	
Clearance Time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	292	350			288		256	1789		28	1348	
v/s Ratio Prot		0.07					c0.07	0.20		0.01	c0.19	
v/s Ratio Perm	0.05				c0.09							
v/c Ratio	0.26	0.34			0.42		0.46	0.39		0.43	0.49	
Uniform Delay, d1	16.4	16.7			17.1		19.5	7.3		24.2	11.6	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.6			1.0		1.3	0.2		10.2	0.4	
Delay (s)	16.9	17.3			18.1		20.8	7.5		34.4	12.0	
Level of Service	B	B			B		C	A		C	B	
Approach Delay (s)		17.2			18.1			9.4			12.4	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	49.7	Sum of lost time (s)	13.0
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
Analysis Period (min)	15		

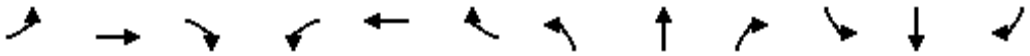
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	125	93	14	21	22
Future Volume (Veh/h)	5	125	93	14	21	22
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	136	101	15	23	24
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	124				264	118
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	124				264	118
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	97
cM capacity (veh/h)	1453				718	927

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	141	116	47
Volume Left	5	0	23
Volume Right	0	15	24
cSH	1453	1700	811
Volume to Capacity	0.00	0.07	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.3	0.0	9.7
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	9.7
Approach LOS			A

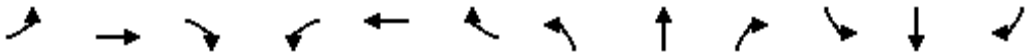
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	129	2	1	86	18	1	1	2	27	0	19
Future Volume (Veh/h)	14	129	2	1	86	18	1	1	2	27	0	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	140	2	1	93	20	1	1	2	29	0	21
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	115			142			299	288	141	280	279	107
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	115			142			299	288	141	280	279	107
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	96	100	98
cM capacity (veh/h)	1471			1441			632	614	907	662	621	944

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	157	114	4	50
Volume Left	15	1	1	29
Volume Right	2	20	2	21
cSH	1471	1441	738	757
Volume to Capacity	0.01	0.00	0.01	0.07
Queue Length 95th (ft)	1	0	0	5
Control Delay (s)	0.8	0.1	9.9	10.1
Lane LOS	A	A	A	B
Approach Delay (s)	0.8	0.1	9.9	10.1
Approach LOS			A	B

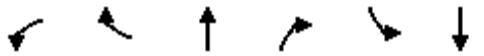
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	27.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	79	79	23	57	1	47	1	32	0	1	0
Future Volume (vph)	1	79	79	23	57	1	47	1	32	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	86	86	25	62	1	51	1	35	0	1	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	173	88	87	1
Volume Left (vph)	1	25	51	0
Volume Right (vph)	86	1	35	0
Hadj (s)	-0.26	0.08	-0.09	0.03
Departure Headway (s)	3.9	4.4	4.4	4.6
Degree Utilization, x	0.19	0.11	0.11	0.00
Capacity (veh/h)	890	802	775	723
Control Delay (s)	7.9	7.9	7.9	7.6
Approach Delay (s)	7.9	7.9	7.9	7.6
Approach LOS	A	A	A	A

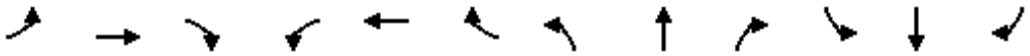
Intersection Summary				
Delay	7.9			
Level of Service	A			
Intersection Capacity Utilization	37.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	43	90	111	63	65	108
Future Volume (vph)	43	90	111	63	65	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	98	121	68	71	117

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	145	189	188
Volume Left (vph)	47	0	71
Volume Right (vph)	98	68	0
Hadj (s)	-0.31	-0.18	0.11
Departure Headway (s)	4.4	4.3	4.6
Degree Utilization, x	0.18	0.22	0.24
Capacity (veh/h)	747	805	753
Control Delay (s)	8.4	8.5	9.0
Approach Delay (s)	8.4	8.5	9.0
Approach LOS	A	A	A

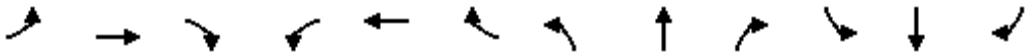
Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	201	18	19	166	42	25	31	37	46	19	12
Future Volume (Veh/h)	8	201	18	19	166	42	25	31	37	46	19	12
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	218	20	21	180	46	27	34	40	50	21	13
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.91						0.91	0.91		0.91	0.91	0.91
vC, conflicting volume	229			249			530	528	247	559	515	210
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	96			249			428	426	247	460	412	75
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			94	93	95	87	95	99
cM capacity (veh/h)	1352			1305			445	455	779	400	464	888

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	247	247	101	84
Volume Left	9	21	27	50
Volume Right	20	46	40	13
cSH	1352	1305	541	454
Volume to Capacity	0.01	0.02	0.19	0.19
Queue Length 95th (ft)	1	1	17	17
Control Delay (s)	0.3	0.8	13.2	14.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	13.2	14.7
Approach LOS			B	B

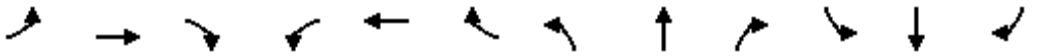
Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	35.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	160	60	263	155	235	63	618	169	242	525	21
Future Volume (vph)	40	160	60	263	155	235	63	618	169	242	525	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	0.96	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844	1529	1681	1746	1516	1770	3412		1770	3509	
Flt Permitted		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1844	1529	1681	1746	1516	1770	3412		1770	3509	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	174	65	286	168	255	68	672	184	263	571	23
RTOR Reduction (vph)	0	0	55	0	0	213	0	24	0	0	3	0
Lane Group Flow (vph)	0	217	10	223	231	42	68	832	0	263	591	0
Confl. Peds. (#/hr)	14		10	10		14			3			15
Confl. Bikes (#/hr)			4			5			3			3
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		15.1	15.1	16.6	16.6	16.6	6.5	32.6		16.9	43.0	
Effective Green, g (s)		15.1	15.1	16.6	16.6	16.6	6.5	32.6		16.9	43.0	
Actuated g/C Ratio		0.15	0.15	0.17	0.17	0.17	0.06	0.33		0.17	0.43	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.5		2.0	3.5	
Lane Grp Cap (vph)		278	230	279	289	251	115	1112		299	1508	
v/s Ratio Prot		c0.12		c0.13	0.13		0.04	c0.24		c0.15	0.17	
v/s Ratio Perm			0.01			0.03						
v/c Ratio		0.78	0.04	0.80	0.80	0.17	0.59	0.75		0.88	0.39	
Uniform Delay, d1		40.9	36.3	40.1	40.1	35.8	45.5	30.0		40.6	19.5	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		12.3	0.0	15.1	14.6	0.4	5.3	4.6		23.5	0.8	
Delay (s)		53.1	36.3	55.2	54.7	36.2	50.8	34.7		64.1	20.3	
Level of Service		D	D	E	D	D	D	C		E	C	
Approach Delay (s)		49.3			48.2			35.9			33.7	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	39.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		

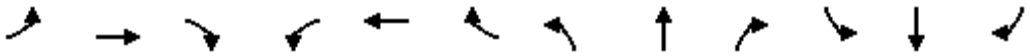
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	513	6	22	570	63	9	10	57	118	8	30
Future Volume (vph)	15	513	6	22	570	63	9	10	57	118	8	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3531		1764	3482			3091			1779	1542
Flt Permitted	0.39	1.00		0.44	1.00			0.91			0.68	1.00
Satd. Flow (perm)	727	3531		817	3482			2835			1261	1542
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	558	7	24	620	68	10	11	62	128	9	33
RTOR Reduction (vph)	0	1	0	0	9	0	0	46	0	0	0	24
Lane Group Flow (vph)	16	564	0	24	679	0	0	37	0	0	137	9
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	13.5	13.5		13.5	13.5			8.1			8.1	8.1
Effective Green, g (s)	13.5	13.5		13.5	13.5			8.1			8.1	8.1
Actuated g/C Ratio	0.43	0.43		0.43	0.43			0.26			0.26	0.26
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	315	1532		354	1511			738			328	401
v/s Ratio Prot		0.16			c0.19							
v/s Ratio Perm	0.02			0.03				0.01			c0.11	0.01
v/c Ratio	0.05	0.37		0.07	0.45			0.05			0.42	0.02
Uniform Delay, d1	5.1	5.9		5.1	6.2			8.6			9.5	8.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.1	0.2		0.1	0.2			0.0			1.2	0.0
Delay (s)	5.2	6.1		5.2	6.4			8.7			10.7	8.6
Level of Service	A	A		A	A			A			B	A
Approach Delay (s)		6.1			6.4			8.7			10.3	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	6.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	31.1	Sum of lost time (s)	9.5
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

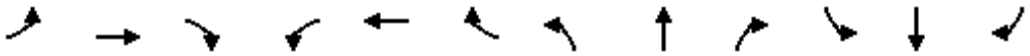
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	10	12	24	10	80	16	653	44	102	680	15
Future Volume (vph)	33	10	12	24	10	80	16	653	44	102	680	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1743			1797	1555	1770	3500		1770	3526	
Flt Permitted		0.79			0.75	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1427			1401	1555	1770	3500		1770	3526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	11	13	26	11	87	17	710	48	111	739	16
RTOR Reduction (vph)	0	11	0	0	0	76	0	5	0	0	1	0
Lane Group Flow (vph)	0	49	0	0	37	11	17	753	0	111	754	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		5.6			5.6	5.6	0.9	19.4		6.9	25.4	
Effective Green, g (s)		5.6			5.6	5.6	0.9	19.4		6.9	25.4	
Actuated g/C Ratio		0.12			0.12	0.12	0.02	0.43		0.15	0.56	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		175			172	190	34	1489		267	1964	
v/s Ratio Prot							0.01	c0.22		c0.06	0.21	
v/s Ratio Perm		c0.03			0.03	0.01						
v/c Ratio		0.28			0.22	0.06	0.50	0.51		0.42	0.38	
Uniform Delay, d1		18.2			18.0	17.7	22.1	9.6		17.5	5.7	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.2	0.0	11.1	0.3		1.1	0.1	
Delay (s)		18.5			18.2	17.7	33.2	9.9		18.6	5.8	
Level of Service		B			B	B	C	A		B	A	
Approach Delay (s)		18.5			17.9			10.4			7.5	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	9.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	45.6	Sum of lost time (s)	13.7
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

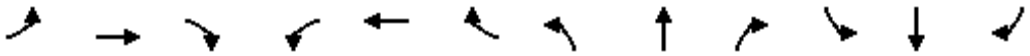
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	135	10	11	82	0	22	0	19	0	0	0
Future Volume (Veh/h)	2	135	10	11	82	0	22	0	19	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	147	11	12	89	0	24	0	21	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	89			158			270	270	152	290	275	89
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			158			270	270	152	290	275	89
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			96	100	98	100	100	100
cM capacity (veh/h)	1506			1422			678	631	894	641	626	969

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	160	101	45	0
Volume Left	2	12	24	0
Volume Right	11	0	21	0
cSH	1506	1422	764	1700
Volume to Capacity	0.00	0.01	0.06	0.00
Queue Length 95th (ft)	0	1	5	0
Control Delay (s)	0.1	1.0	10.0	0.0
Lane LOS	A	A	B	A
Approach Delay (s)	0.1	1.0	10.0	0.0
Approach LOS			B	A

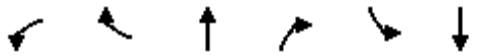
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	21.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	75	16	0	29	0	16	1	5	0	0	0
Future Volume (Veh/h)	0	75	16	0	29	0	16	1	5	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	82	17	0	32	0	17	1	5	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	32			99			122	122	90	128	131	32
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	32			99			122	122	90	128	131	32
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	100	99	100	100	100
cM capacity (veh/h)	1580			1494			852	768	967	840	760	1042

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	99	32	23	0
Volume Left	0	0	17	0
Volume Right	17	0	5	0
cSH	1580	1494	871	1700
Volume to Capacity	0.00	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	2	0
Control Delay (s)	0.0	0.0	9.2	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.2	0.0
Approach LOS			A	A

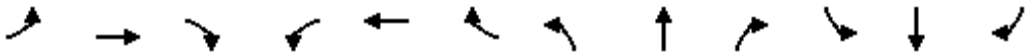
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	14.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	37	154	11	21	184	11
Future Volume (vph)	37	154	11	21	184	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	167	12	23	200	12

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	207	35	212
Volume Left (vph)	40	0	200
Volume Right (vph)	167	23	0
Hadj (s)	-0.41	-0.36	0.22
Departure Headway (s)	4.1	4.2	4.6
Degree Utilization, x	0.23	0.04	0.27
Capacity (veh/h)	830	791	742
Control Delay (s)	8.3	7.4	9.3
Approach Delay (s)	8.3	7.4	9.3
Approach LOS	A	A	A

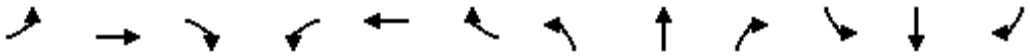
Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	203	61	9	159	10	83	11	12	3	8	15
Future Volume (Veh/h)	6	203	61	9	159	10	83	11	12	3	8	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	221	66	10	173	11	90	12	13	3	9	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	184			287			487	472	254	486	500	178
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	184			287			487	472	254	486	500	178
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			81	98	98	99	98	98
cM capacity (veh/h)	1391			1275			470	484	785	470	467	864

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	294	194	115	28
Volume Left	7	10	90	3
Volume Right	66	11	13	16
cSH	1391	1275	494	634
Volume to Capacity	0.01	0.01	0.23	0.04
Queue Length 95th (ft)	0	1	22	3
Control Delay (s)	0.2	0.5	14.5	10.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.5	14.5	10.9
Approach LOS			B	B

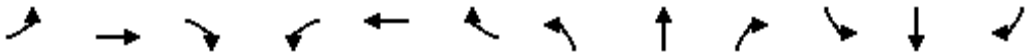
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	35.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	208	5	15	173	26	3	7	14	12	3	3
Future Volume (Veh/h)	3	208	5	15	173	26	3	7	14	12	3	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	226	5	16	188	28	3	8	15	13	3	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	216			231			473	482	228	488	471	202
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	216			231			473	482	228	488	471	202
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	98	98	97	99	100
cM capacity (veh/h)	1354			1337			492	477	811	470	484	839

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	234	232	26	19
Volume Left	3	16	3	13
Volume Right	5	28	15	3
cSH	1354	1337	628	508
Volume to Capacity	0.00	0.01	0.04	0.04
Queue Length 95th (ft)	0	1	3	3
Control Delay (s)	0.1	0.6	11.0	12.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.6	11.0	12.4
Approach LOS			B	B

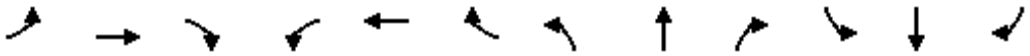
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	30.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	118	106	51	68	23	117	696	74	92	552	41
Future Volume (vph)	53	118	106	51	68	23	117	696	74	92	552	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.95			0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750			1790		1770	3488		1770	3502	
Flt Permitted		0.91			0.80		0.95	1.00		0.34	1.00	
Satd. Flow (perm)		1610			1450		1770	3488		627	3502	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	128	115	55	74	25	127	757	80	100	600	45
RTOR Reduction (vph)	0	23	0	0	7	0	0	9	0	0	6	0
Lane Group Flow (vph)	0	278	0	0	147	0	127	828	0	100	639	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		16.5			16.1		7.5	30.2		18.5	18.5	
Effective Green, g (s)		16.5			16.1		7.5	30.2		18.5	18.5	
Actuated g/C Ratio		0.29			0.29		0.13	0.54		0.33	0.33	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		471			414		235	1871		206	1150	
v/s Ratio Prot							0.07	c0.24			c0.18	
v/s Ratio Perm		c0.17			0.10					0.16		
v/c Ratio		0.59			0.35		0.54	0.44		0.49	0.56	
Uniform Delay, d1		17.0			16.0		22.8	7.9		15.1	15.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.0			0.6		1.4	0.2		1.8	0.6	
Delay (s)		19.0			16.6		24.2	8.1		16.9	16.1	
Level of Service		B			B		C	A		B	B	
Approach Delay (s)		19.0			16.6			10.2			16.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	14.2
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

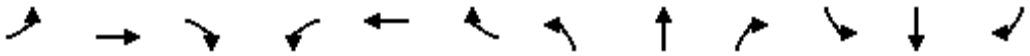
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	260	13	13	117	5	15	18	6	8	7	9
Future Volume (Veh/h)	9	260	13	13	117	5	15	18	6	8	7	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	283	14	14	127	5	16	20	7	9	8	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked				0.99			0.99	0.99	0.99	0.99	0.99	
vC, conflicting volume	132			297			482	470	290	484	474	130
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	132			284			470	459	277	473	463	130
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	96	99	98	98	99
cM capacity (veh/h)	1453			1265			480	485	754	469	482	920

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	307	146	43	27
Volume Left	10	14	16	9
Volume Right	14	5	7	10
cSH	1453	1265	512	579
Volume to Capacity	0.01	0.01	0.08	0.05
Queue Length 95th (ft)	1	1	7	4
Control Delay (s)	0.3	0.8	12.7	11.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	12.7	11.5
Approach LOS			B	B

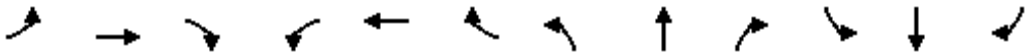
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	26.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	251	9	11	119	3	12	23	11	4	10	6
Future Volume (vph)	9	251	9	11	119	3	12	23	11	4	10	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	273	10	12	129	3	13	25	12	4	11	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	293	144	50	22
Volume Left (vph)	10	12	13	4
Volume Right (vph)	10	3	12	7
Hadj (s)	0.02	0.04	-0.06	-0.12
Departure Headway (s)	4.3	4.4	4.8	4.8
Degree Utilization, x	0.35	0.18	0.07	0.03
Capacity (veh/h)	828	781	677	670
Control Delay (s)	9.5	8.4	8.2	8.0
Approach Delay (s)	9.5	8.4	8.2	8.0
Approach LOS	A	A	A	A

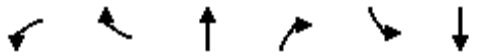
Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	26.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	267	16	68	115	33	16	80	154	63	17	4
Future Volume (vph)	17	267	16	68	115	33	16	80	154	63	17	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	290	17	74	125	36	17	87	167	68	18	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	325	235	271	90
Volume Left (vph)	18	74	17	68
Volume Right (vph)	17	36	167	4
Hadj (s)	0.01	0.01	-0.32	0.16
Departure Headway (s)	5.3	5.5	5.3	6.1
Degree Utilization, x	0.48	0.36	0.40	0.15
Capacity (veh/h)	634	610	622	509
Control Delay (s)	13.2	11.5	11.7	10.2
Approach Delay (s)	13.2	11.5	11.7	10.2
Approach LOS	B	B	B	B

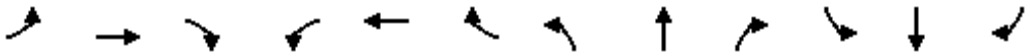
Intersection Summary				
Delay	12.0			
Level of Service	B			
Intersection Capacity Utilization	60.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	5	57	58	4	41	22
Future Volume (vph)	5	57	58	4	41	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	62	63	4	45	24

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	67	67	69
Volume Left (vph)	5	0	45
Volume Right (vph)	62	4	0
Hadj (s)	-0.51	0.00	0.16
Departure Headway (s)	3.7	4.1	4.3
Degree Utilization, x	0.07	0.08	0.08
Capacity (veh/h)	938	851	826
Control Delay (s)	7.0	7.4	7.6
Approach Delay (s)	7.0	7.4	7.6
Approach LOS	A	A	A

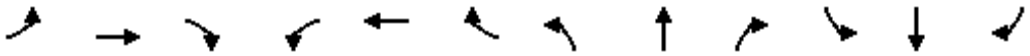
Intersection Summary			
Delay	7.3		
Level of Service	A		
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	103	33	203	82	350	37	569	269	293	478	18
Future Volume (vph)	15	103	33	203	82	350	37	569	269	293	478	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1532		1799	1583	1770	3330		1770	3514	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1532		1799	1583	1770	3330		1770	3514	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	112	36	221	89	380	40	618	292	318	520	20
RTOR Reduction (vph)	0	0	33	0	0	305	0	53	0	0	2	0
Lane Group Flow (vph)	16	112	3	0	310	75	40	857	0	318	538	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	Over	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	7.2	7.2	7.2		18.9	18.0	3.3	27.6		18.0	42.3	
Effective Green, g (s)	7.2	7.2	7.2		18.9	18.0	3.3	27.6		18.0	42.3	
Actuated g/C Ratio	0.08	0.08	0.08		0.21	0.20	0.04	0.30		0.20	0.47	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	140	147	121		374	313	64	1012		350	1637	
v/s Ratio Prot	0.01	c0.06			c0.17	0.05	0.02	c0.26		c0.18	0.15	
v/s Ratio Perm			0.00									
v/c Ratio	0.11	0.76	0.02		0.83	0.24	0.62	0.85		0.91	0.33	
Uniform Delay, d1	38.8	41.0	38.6		34.4	30.6	43.1	29.6		35.6	15.3	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	18.7	0.0		14.0	0.1	12.9	6.7		25.8	0.1	
Delay (s)	39.0	59.6	38.6		48.4	30.8	56.0	36.3		61.4	15.4	
Level of Service	D	E	D		D	C	E	D		E	B	
Approach Delay (s)		53.0			38.7			37.1			32.4	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	37.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	90.8	Sum of lost time (s)	19.1
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

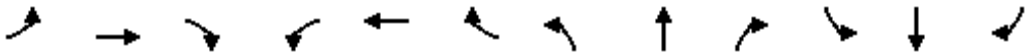
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	618	6	8	594	28	4	0	8	13	3	30
Future Volume (Veh/h)	5	618	6	8	594	28	4	0	8	13	3	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	672	7	9	646	30	4	0	9	14	3	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	676			679			1399	1380	676	1374	1368	661
vC1, stage 1 conf vol							686	686		679	679	
vC2, stage 2 conf vol							714	694		694	689	
vCu, unblocked vol	676			635			1394	1373	631	1367	1361	661
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	100	98	96	99	93
cM capacity (veh/h)	915			900			297	330	456	314	331	462

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	684	685	13	50
Volume Left	5	9	4	14
Volume Right	7	30	9	33
cSH	915	900	392	400
Volume to Capacity	0.01	0.01	0.03	0.13
Queue Length 95th (ft)	0	1	3	11
Control Delay (s)	0.1	0.3	14.5	15.3
Lane LOS	A	A	B	C
Approach Delay (s)	0.1	0.3	14.5	15.3
Approach LOS			B	C

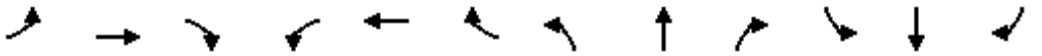
Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	48.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	730	5	12	718	33	1	1	19	13	1	8
Future Volume (Veh/h)	5	730	5	12	718	33	1	1	19	13	1	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	793	5	13	780	36	1	1	21	14	1	9
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.98			0.98	0.98	0.98	0.98	0.98	
vC, conflicting volume	816			799			1641	1648	796	1651	1633	799
vC1, stage 1 conf vol							806	806		824	824	
vC2, stage 2 conf vol							834	842		827	809	
vCu, unblocked vol	816			784			1644	1652	782	1654	1636	799
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			100	100	95	94	100	98
cM capacity (veh/h)	812			816			256	277	386	247	278	385

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	803	829	23	24
Volume Left	5	13	1	14
Volume Right	5	36	21	9
cSH	812	816	371	287
Volume to Capacity	0.01	0.02	0.06	0.08
Queue Length 95th (ft)	0	1	5	7
Control Delay (s)	0.2	0.4	15.3	18.7
Lane LOS	A	A	C	C
Approach Delay (s)	0.2	0.4	15.3	18.7
Approach LOS			C	C

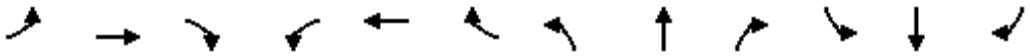
Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	61.5%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	722	0	9	743	205	0	0	5	3	0	11
Future Volume (Veh/h)	8	722	0	9	743	205	0	0	5	3	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	785	0	10	808	223	0	0	5	3	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1031			785			1643	1854	785	1748	1742	920
vC1, stage 1 conf vol							803	803		940	940	
vC2, stage 2 conf vol							840	1051		808	803	
vCu, unblocked vol	1031			785			1643	1854	785	1748	1742	920
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	99	99	100	96
cM capacity (veh/h)	674			834			253	237	393	237	260	329

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	794	7	1034	5	15
Volume Left	9	7	3	0	3
Volume Right	0	0	223	5	12
cSH	674	834	834	393	305
Volume to Capacity	0.01	0.01	0.01	0.01	0.05
Queue Length 95th (ft)	1	1	1	1	4
Control Delay (s)	0.4	9.4	0.3	14.3	17.4
Lane LOS	A	A	A	B	C
Approach Delay (s)	0.4	0.4		14.3	17.4
Approach LOS				B	C

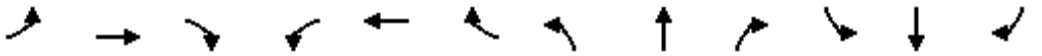
Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	41	5	0	13	43	721	4	18	578	4
Future Volume (Veh/h)	0	0	41	5	0	13	43	721	4	18	578	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	45	5	0	14	47	784	4	20	628	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked	0.87	0.87	0.87	0.87	0.87		0.87					
vC, conflicting volume	1170	1552	630	1593	1552	394	632			788		
vC1, stage 1 conf vol	670	670		880	880							
vC2, stage 2 conf vol	500	882		713	672							
vCu, unblocked vol	1119	1560	496	1607	1560	394	498			788		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	90	98	100	98	95			98		
cM capacity (veh/h)	327	267	450	210	266	605	920			827		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	45	19	47	523	265	13	639
Volume Left	0	5	47	0	0	13	7
Volume Right	45	14	0	0	4	0	4
cSH	450	405	920	1700	1700	827	827
Volume to Capacity	0.10	0.05	0.05	0.31	0.16	0.02	0.02
Queue Length 95th (ft)	8	4	4	0	0	2	2
Control Delay (s)	13.9	14.3	9.1	0.0	0.0	9.5	0.5
Lane LOS	B	B	A			A	A
Approach Delay (s)	13.9	14.3	0.5			0.6	
Approach LOS	B	B					

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	45.7%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	51	50	33	7	16	16	690	28	12	690	30
Future Volume (vph)	111	51	50	33	7	16	16	690	28	12	690	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95			0.95	
Frt		1.00	0.85		1.00	0.85		0.99			0.99	
Flt Protected		0.97	1.00		0.96	1.00		1.00			1.00	
Satd. Flow (prot)		1801	1583		1790	1583		3515			3514	
Flt Permitted		0.77	1.00		0.72	1.00		0.93			0.94	
Satd. Flow (perm)		1429	1583		1347	1583		3289			3310	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	55	54	36	8	17	17	750	30	13	750	33
RTOR Reduction (vph)	0	0	44	0	0	14	0	2	0	0	3	0
Lane Group Flow (vph)	0	176	10	0	44	3	0	795	0	0	793	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		15.0	15.0		15.0	15.0		57.0			57.0	
Effective Green, g (s)		15.0	15.0		15.0	15.0		57.0			57.0	
Actuated g/C Ratio		0.19	0.19		0.19	0.19		0.71			0.71	
Clearance Time (s)		4.0	4.0		4.0	4.0		4.0			4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		267	296		252	296		2343			2358	
v/s Ratio Prot												
v/s Ratio Perm		c0.12	0.01		0.03	0.00		c0.24			0.24	
v/c Ratio		0.66	0.03		0.17	0.01		0.34			0.34	
Uniform Delay, d1		30.1	26.6		27.3	26.5		4.4			4.3	
Progression Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Incremental Delay, d2		5.8	0.0		0.3	0.0		0.4			0.4	
Delay (s)		35.9	26.6		27.6	26.5		4.8			4.7	
Level of Service		D	C		C	C		A			A	
Approach Delay (s)		33.7			27.3			4.8			4.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

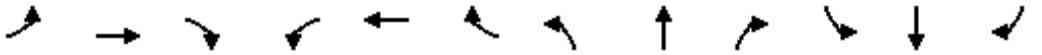
c Critical Lane Group

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	85	12	27	93	39	7	86	32	0	0	0
Future Vol, veh/h	40	85	12	27	93	39	7	86	32	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	92	13	29	101	42	8	93	35	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.5	8.4	8.5
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	6%	29%	17%
Vol Thru, %	69%	62%	58%
Vol Right, %	26%	9%	25%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	125	137	159
LT Vol	7	40	27
Through Vol	86	85	93
RT Vol	32	12	39
Lane Flow Rate	136	149	173
Geometry Grp	1	1	1
Degree of Util (X)	0.17	0.184	0.207
Departure Headway (Hd)	4.505	4.444	4.304
Convergence, Y/N	Yes	Yes	Yes
Cap	798	809	835
Service Time	2.529	2.463	2.322
HCM Lane V/C Ratio	0.17	0.184	0.207
HCM Control Delay	8.5	8.5	8.4
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.6	0.7	0.8



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	834	139	45	735	259	177	56	72	612	136	449
Future Volume (veh/h)	70	834	139	45	735	259	177	56	72	612	136	449
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	76	907	151	49	799	282	126	153	78	771	0	488
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	118	945	157	79	1022	457	335	352	299	986	0	440
Arrive On Green	0.07	0.31	0.31	0.04	0.29	0.29	0.19	0.19	0.19	0.28	0.00	0.28
Sat Flow, veh/h	1774	3038	506	1774	3539	1583	1774	1863	1583	3548	0	1583
Grp Volume(v), veh/h	76	528	530	49	799	282	126	153	78	771	0	488
Grp Sat Flow(s),veh/h/ln	1774	1770	1774	1774	1770	1583	1774	1863	1583	1774	0	1583
Q Serve(g_s), s	3.8	26.4	26.4	2.4	18.7	13.9	5.6	6.5	3.8	18.0	0.0	25.0
Cycle Q Clear(g_c), s	3.8	26.4	26.4	2.4	18.7	13.9	5.6	6.5	3.8	18.0	0.0	25.0
Prop In Lane	1.00		0.29	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	118	551	552	79	1022	457	335	352	299	986	0	440
V/C Ratio(X)	0.64	0.96	0.96	0.62	0.78	0.62	0.38	0.43	0.26	0.78	0.00	1.11
Avail Cap(c_a), veh/h	118	551	552	79	1022	457	335	352	299	986	0	440
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.0	30.4	30.4	42.3	29.4	27.7	31.9	32.3	31.1	30.0	0.0	32.5
Incr Delay (d2), s/veh	23.8	29.6	29.6	31.6	5.9	6.1	3.2	3.9	2.1	6.2	0.0	76.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	17.3	17.3	1.9	9.9	6.8	3.0	3.7	1.8	9.6	0.0	20.2
LnGrp Delay(d),s/veh	64.8	60.0	60.0	73.9	35.3	33.8	35.1	36.1	33.2	36.2	0.0	108.6
LnGrp LOS	E	E	E	E	D	C	D	D	C	D		F
Approach Vol, veh/h		1134			1130			357			1259	
Approach Delay, s/veh		60.4			36.6			35.1			64.3	
Approach LOS		E			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	8.0	32.0		29.0	10.0	30.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	28.0		25.0	6.0	26.0
Max Q Clear Time (g_c+I1), s		8.5	4.4	28.4		27.0	5.8	20.7
Green Ext Time (p_c), s		1.0	0.0	0.0		0.0	0.0	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	52.4
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	252	584	23	69	857	426	21	7	37	417	19	103
Future Volume (veh/h)	252	584	23	69	857	426	21	7	37	417	19	103
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	274	635	25	75	932	463	23	8	40	293	245	112
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	296	1157	46	177	944	422	267	93	317	335	229	105
Arrive On Green	0.17	0.33	0.33	0.10	0.27	0.27	0.20	0.20	0.20	0.19	0.19	0.19
Sat Flow, veh/h	1774	3472	137	1774	3539	1583	1333	464	1583	1774	1211	554
Grp Volume(v), veh/h	274	323	337	75	932	463	31	0	40	293	0	357
Grp Sat Flow(s),veh/h/ln	1774	1770	1839	1774	1770	1583	1796	0	1583	1774	0	1765
Q Serve(g_s), s	13.7	13.4	13.4	3.6	23.6	24.0	1.3	0.0	1.9	14.4	0.0	17.0
Cycle Q Clear(g_c), s	13.7	13.4	13.4	3.6	23.6	24.0	1.3	0.0	1.9	14.4	0.0	17.0
Prop In Lane	1.00		0.07	1.00		1.00	0.74		1.00	1.00		0.31
Lane Grp Cap(c), veh/h	296	590	613	177	944	422	359	0	317	335	0	333
V/C Ratio(X)	0.93	0.55	0.55	0.42	0.99	1.10	0.09	0.00	0.13	0.87	0.00	1.07
Avail Cap(c_a), veh/h	296	590	613	177	944	422	359	0	317	335	0	333
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.0	24.5	24.5	38.1	32.9	33.0	29.3	0.0	29.5	35.5	0.0	36.5
Incr Delay (d2), s/veh	36.5	3.6	3.5	7.2	26.4	72.5	0.5	0.0	0.8	25.7	0.0	69.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.7	7.2	7.4	2.1	15.0	18.9	0.7	0.0	0.9	9.5	0.0	14.7
LnGrp Delay(d),s/veh	73.5	28.1	28.0	45.3	59.3	105.5	29.8	0.0	30.4	61.2	0.0	105.9
LnGrp LOS	E	C	C	D	E	F	C		C	E		F
Approach Vol, veh/h		934			1470			71			650	
Approach Delay, s/veh		41.4			73.1			30.1			85.7	
Approach LOS		D			E			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.0	13.0	34.0		21.0	19.0	28.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	9.0	30.0		17.0	15.0	24.0
Max Q Clear Time (g_c+I1), s		3.9	5.6	15.4		19.0	15.7	26.0
Green Ext Time (p_c), s		0.2	0.0	3.5		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	65.3
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1094	10	163	1017	450	8	0	62	323	18	125
Future Volume (veh/h)	0	1094	10	163	1017	450	8	0	62	323	18	125
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	1863	1863	0	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	1189	11	177	1105	0	9	0	67	365	0	136
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1387	13	218	2049	917	0	0	0	996	0	444
Arrive On Green	0.00	0.39	0.39	0.12	0.58	0.00	0.00	0.00	0.00	0.28	0.00	0.28
Sat Flow, veh/h	0	3686	33	1774	3539	1583		0		3548	0	1583
Grp Volume(v), veh/h	0	586	614	177	1105	0		0.0		365	0	136
Grp Sat Flow(s),veh/h/ln	0	1770	1857	1774	1770	1583				1774	0	1583
Q Serve(g_s), s	0.0	17.3	17.3	5.5	10.9	0.0				4.7	0.0	3.9
Cycle Q Clear(g_c), s	0.0	17.3	17.3	5.5	10.9	0.0				4.7	0.0	3.9
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	683	717	218	2049	917				996	0	444
V/C Ratio(X)	0.00	0.86	0.86	0.81	0.54	0.00				0.37	0.00	0.31
Avail Cap(c_a), veh/h	0	683	717	218	2049	917				996	0	444
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	16.1	16.1	24.4	7.3	0.0				16.4	0.0	16.1
Incr Delay (d2), s/veh	0.0	13.1	12.6	27.1	1.0	0.0				1.0	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	10.8	11.2	4.3	5.5	0.0				2.4	0.0	1.9
LnGrp Delay(d),s/veh	0.0	29.2	28.7	51.5	8.4	0.0				17.5	0.0	17.9
LnGrp LOS		C	C	D	A					B		B
Approach Vol, veh/h		1200			1282						501	
Approach Delay, s/veh		28.9			14.3						17.6	
Approach LOS		C			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			11.0	26.0		20.0		37.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			7.0	22.0		16.0		33.0
Max Q Clear Time (g_c+I1), s			7.5	19.3		6.7		12.9
Green Ext Time (p_c), s			0.0	1.8		1.3		8.2

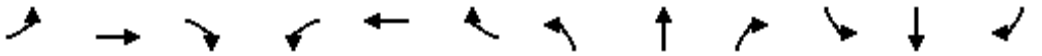
Intersection Summary	
HCM 2010 Ctrl Delay	20.7
HCM 2010 LOS	C

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	582	209	627	667	0	0
Future Volume (veh/h)	582	209	627	667	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863		
Adj Flow Rate, veh/h	633	227	682	725		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1593	712	1205	3185		
Arrive On Green	0.45	0.45	0.35	0.90		
Sat Flow, veh/h	3632	1583	3442	3632		
Grp Volume(v), veh/h	633	227	682	725		
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770		
Q Serve(g_s), s	4.8	3.7	6.4	1.0		
Cycle Q Clear(g_c), s	4.8	3.7	6.4	1.0		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1593	712	1205	3185		
V/C Ratio(X)	0.40	0.32	0.57	0.23		
Avail Cap(c_a), veh/h	1593	712	1205	3185		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	7.4	7.1	10.5	0.3		
Incr Delay (d2), s/veh	0.7	1.2	1.9	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.5	1.8	3.4	0.5		
LnGrp Delay(d),s/veh	8.1	8.2	12.5	0.4		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	860			1407		
Approach Delay, s/veh	8.1			6.3		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			18.0	22.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			14.0	18.0				36.0
Max Q Clear Time (g_c+I1), s			8.4	6.8				3.0
Green Ext Time (p_c), s			1.4	3.9				5.8

Intersection Summary	
HCM 2010 Ctrl Delay	7.0
HCM 2010 LOS	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	78	51	71	290	486	142	14	107	71	18	66
Future Volume (vph)	85	78	51	71	290	486	142	14	107	71	18	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3158	1441		1782	1583		1792	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3158	1441		1782	1583		1792	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	85	55	77	315	528	154	15	116	77	20	72
RTOR Reduction (vph)	0	0	47	0	181	218	0	0	81	0	0	56
Lane Group Flow (vph)	92	85	8	77	398	46	0	169	35	0	97	16
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.2	11.0	11.0	6.6	14.0	14.0		24.6	24.6		17.6	17.6
Effective Green, g (s)	7.2	11.0	11.0	6.6	14.0	14.0		24.6	24.6		17.6	17.6
Actuated g/C Ratio	0.09	0.14	0.14	0.08	0.17	0.17		0.31	0.31		0.22	0.22
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	158	254	216	144	548	250		543	483		391	345
v/s Ratio Prot	c0.05	0.05		0.04	c0.13			c0.09			c0.05	
v/s Ratio Perm			0.00			0.03			0.02			0.01
v/c Ratio	0.58	0.33	0.03	0.53	0.73	0.18		0.31	0.07		0.25	0.05
Uniform Delay, d1	35.3	31.5	30.2	35.5	31.5	28.4		21.5	19.9		26.0	24.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	5.4	0.3	0.0	3.8	4.1	0.1		1.5	0.3		1.5	0.2
Delay (s)	40.6	31.8	30.2	39.3	35.5	28.6		23.0	20.2		27.5	25.1
Level of Service	D	C	C	D	D	C		C	C		C	C
Approach Delay (s)		34.9			33.8			21.9			26.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	20.8
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	07/22/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	2	0	325	0	239	0	1	113	369	0	76	105	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	2	0	360	0	260	0	1	125	409	0	84	116	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		2		0	360	260		126	409	84	116	
Entry Volume veh/h		2		0	353	260		124	401	82	114	
Circulating Flow (Vc), pc/h	560			126			84			361		
Exiting Flow (Vex), pc/h	84			1			125			478		
Capacity (cPCE), pc/h		645		1028	1035			1065		862	878	
Capacity (c), veh/h		633		1008	1014			1045		845	860	
v/c Ratio (X)		0.00		0.00	0.35			0.12		0.10	0.13	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.7		3.6	7.2	0.0		4.5	0.0	5.2	5.5	
Lane LOS		A		A	A	A		A	A	A	A	
95% Queue		0.0		0.0	1.6			0.4		0.3	0.5	
Approach Delay, s/veh	5.7			4.1			1.1			5.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	3.1						A					

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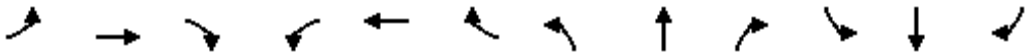

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	4	39	9	29	50	53	28	43	42	79	59	12
Future Volume (vph)	4	39	9	29	50	53	28	43	42	79	59	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	42	10	32	54	58	30	47	46	86	64	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	56	144	123	163
Volume Left (vph)	4	32	30	86
Volume Right (vph)	10	58	46	13
Hadj (s)	-0.06	-0.16	-0.14	0.09
Departure Headway (s)	4.7	4.5	4.4	4.6
Degree Utilization, x	0.07	0.18	0.15	0.21
Capacity (veh/h)	704	748	767	738
Control Delay (s)	8.1	8.5	8.2	8.8
Approach Delay (s)	8.1	8.5	8.2	8.8
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	35.7%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Surfrider Way
E/W Street Name	Surfrider Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1
Lane Assignment			LTR				LTR				LTR		LT		R	
Volume (V), veh/h	0	112	11	31	0	6	21	43	0	29	218	13	0	17	299	64
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	124	12	34	0	7	23	48	0	32	242	14	0	19	332	71
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929		5.1929	5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		170			78			288		351	71	
Entry Volume veh/h		167			76			282		344	70	
Circulating Flow (Vc), pc/h	358			398			155			62		
Exiting Flow (Vex), pc/h	45			126			414			373		
Capacity (cPCE), pc/h		790			759			968		1062	1062	
Capacity (c), veh/h		774			744			949		1041	1041	
v/c Ratio (X)		0.22			0.10			0.30		0.33	0.07	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.0			5.9			6.9		6.8	4.0	
Lane LOS		A			A			A		A	A	
95% Queue		0.8			0.3			1.3		1.5	0.2	
Approach Delay, s/veh	7.0			5.9			6.9			6.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.6						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	07/22/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	9	7	6	0	18	10	18	0	5	210	22	0	52	250	9
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	10	8	7	0	20	11	20	0	6	233	24	0	58	277	10
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		25			51			263			345	
Entry Volume veh/h		25			50			258			338	
Circulating Flow (Vc), pc/h		355			249			76			37	
Exiting Flow (Vex), pc/h		90			27			263			304	
Capacity (cPCE), pc/h		792			881			1047			1089	
Capacity (c), veh/h		777			864			1027			1068	
v/c Ratio (X)		0.03			0.06			0.25			0.32	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.9			4.7			5.9			6.5	
Lane LOS		A			A			A			A	
95% Queue		0.1			0.2			1.0			1.4	
Approach Delay, s/veh	4.9			4.7			5.9			6.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.1						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/11/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	6	9	9	0	10	14	15	0	7	217	11	0	11	236	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	7	10	10	0	11	16	17	0	8	241	12	0	12	262	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		27			44			261			294	
Entry Volume veh/h		26			43			256			288	
Circulating Flow (Vc), pc/h	285			256			29			35		
Exiting Flow (Vex), pc/h	34			44			265			283		
Capacity (cPCE), pc/h		850			875			1098			1091	
Capacity (c), veh/h		833			858			1076			1070	
v/c Ratio (X)		0.03			0.05			0.24			0.27	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.6			4.7			5.6			5.9	
Lane LOS		A			A			A			A	
95% Queue		0.1			0.2			0.9			1.1	
Approach Delay, s/veh	4.6			4.7			5.6			5.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	5.6						A					

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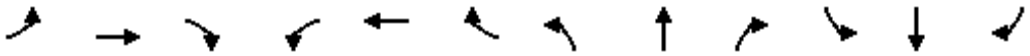
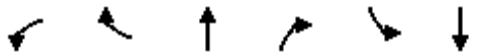


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	5	19	17	9	5	88	137	6	7	94	6
Future Volume (vph)	2	5	19	17	9	5	88	137	6	7	94	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	5	21	18	10	5	96	149	7	8	102	7

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	7	21	33	252	117
Volume Left (vph)	2	0	18	96	8
Volume Right (vph)	0	21	5	7	7
Hadj (s)	0.18	-0.67	0.05	0.09	0.01
Departure Headway (s)	5.5	4.7	4.9	4.3	4.3
Degree Utilization, x	0.01	0.03	0.05	0.30	0.14
Capacity (veh/h)	599	704	670	824	801
Control Delay (s)	7.4	6.6	8.2	9.1	8.0
Approach Delay (s)	6.8		8.2	9.1	8.0
Approach LOS	A		A	A	A

Intersection Summary				
Delay	8.6			
Level of Service	A			
Intersection Capacity Utilization	34.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	80	46	74	56	27	65
Future Volume (vph)	80	46	74	56	27	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	50	80	61	29	71

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	87	50	141	100
Volume Left (vph)	87	0	0	29
Volume Right (vph)	0	50	61	0
Hadj (s)	0.53	-0.67	-0.23	0.09
Departure Headway (s)	5.6	4.4	4.1	4.5
Degree Utilization, x	0.13	0.06	0.16	0.12
Capacity (veh/h)	612	779	835	763
Control Delay (s)	8.2	6.5	7.9	8.1
Approach Delay (s)	7.6		7.9	8.1
Approach LOS	A		A	A

Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Year 2013 No Project

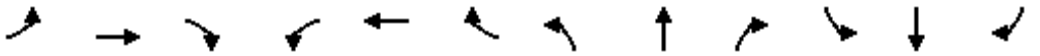
Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #9 Cleveland Street and Mission Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.093
Loss Time (sec):	0	Average Delay (sec/veh):	8.1
Optimal Cycle:	0	Level Of Service:	A

Street Name:	Cleveland Street						Mission Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	0	0 1	0	0 1!	0	0	1 0	1 1	0	1 0	1 1	0
Volume Module:													
Base Vol:	10	10	14	10	13	25	11	91	7	39	111	23
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	10	10	14	10	13	25	11	91	7	39	111	23
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	10	10	14	10	13	25	11	91	7	39	111	23
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	10	10	14	10	13	25	11	91	7	39	111	23
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	10	10	14	10	13	25	11	91	7	39	111	23
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.50	0.50	1.00	0.21	0.27	0.52	1.00	1.86	0.14	1.00	1.66	0.34
Final Sat.:	315	315	755	145	189	363	628	1290	100	646	1199	256
Capacity Analysis Module:												
Vol/Sat:	0.03	0.03	0.02	0.07	0.07	0.07	0.02	0.07	0.07	0.06	0.09	0.09
Crit Moves:	****			****			****			****		
Delay/Veh:	8.3	8.3	7.3	8.3	8.3	8.3	8.4	8.1	8.0	8.5	8.0	7.9
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	8.3	8.3	7.3	8.3	8.3	8.3	8.4	8.1	8.0	8.5	8.0	7.9
LOS by Move:	A	A	A	A	A	A	A	A	A	A	A	A
ApproachDel:	7.9			8.3			8.1			8.1		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	7.9			8.3			8.1			8.1		
LOS by Appr:	A			A			A			A		
AllWayAvgQ:	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1

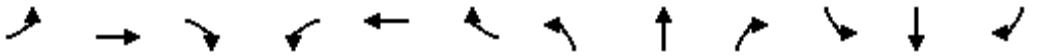
Note: Queue reported is the number of cars per lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	23	124	189	64	14	172	0	0	194	15
Future Volume (vph)	11	0	23	124	189	64	14	172	0	0	194	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	0.95		1.00	1.00			0.95	0.95
Frpb, ped/bikes	1.00		0.96	1.00	0.99		1.00	1.00			1.00	0.97
Flpb, ped/bikes	0.99		1.00	0.98	1.00		1.00	1.00			1.00	1.00
Frt	1.00		0.85	1.00	0.96		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1753		1527	1743	3375		1770	1863			1767	1464
Flt Permitted	0.58		1.00	0.95	1.00		0.60	1.00			1.00	1.00
Satd. Flow (perm)	1075		1527	1743	3375		1124	1863			1767	1464
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	0	25	135	205	70	15	187	0	0	211	16
RTOR Reduction (vph)	0	0	11	0	32	0	0	0	0	0	1	10
Lane Group Flow (vph)	12	0	14	135	243	0	15	187	0	0	212	4
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type	Perm		Perm	Perm	NA		Perm	NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases	4		4	8			2					6
Actuated Green, G (s)	27.3		27.3	27.3	27.3		12.7	12.7			12.7	12.7
Effective Green, g (s)	27.3		27.3	27.3	27.3		12.7	12.7			12.7	12.7
Actuated g/C Ratio	0.55		0.55	0.55	0.55		0.25	0.25			0.25	0.25
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0		4.0	4.0			4.0	4.0
Lane Grp Cap (vph)	586		833	951	1842		285	473			448	371
v/s Ratio Prot					0.07			0.10			c0.12	
v/s Ratio Perm	0.01		0.01	c0.08			0.01					0.00
v/c Ratio	0.02		0.02	0.14	0.13		0.05	0.40			0.47	0.01
Uniform Delay, d1	5.2		5.2	5.6	5.6		14.1	15.5			15.8	13.9
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			0.26	0.62
Incremental Delay, d2	0.1		0.0	0.3	0.1		0.1	0.7			1.0	0.0
Delay (s)	5.3		5.2	5.9	5.7		14.2	16.2			5.1	8.6
Level of Service	A		A	A	A		B	B			A	A
Approach Delay (s)		5.2			5.8			16.1			5.4	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	132	2	50	462	194	3	14	202	132	10	7
Future Volume (vph)	5	132	2	50	462	194	3	14	202	132	10	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.86		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.96	
Satd. Flow (prot)	1770	3532		1770	3539	1583	1770	1601		1681	1679	
Flt Permitted	0.47	1.00		0.66	1.00	1.00	0.70	1.00		0.61	0.63	
Satd. Flow (perm)	871	3532		1229	3539	1583	1308	1601		1084	1103	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	143	2	54	502	211	3	15	220	143	11	8
RTOR Reduction (vph)	0	1	0	0	0	123	0	164	0	0	6	0
Lane Group Flow (vph)	5	144	0	54	502	88	3	71	0	82	74	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	12.6	12.6		12.2	12.2	12.2	7.5	7.5		7.5	7.5	
Effective Green, g (s)	12.6	12.6		12.2	12.2	12.2	7.5	7.5		7.5	7.5	
Actuated g/C Ratio	0.43	0.43		0.42	0.42	0.42	0.26	0.26		0.26	0.26	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	374	1518		511	1473	659	334	409		277	282	
v/s Ratio Prot		0.04			c0.14			0.04				
v/s Ratio Perm	0.01			0.04		0.06	0.00			c0.08	0.07	
v/c Ratio	0.01	0.09		0.11	0.34	0.13	0.01	0.17		0.30	0.26	
Uniform Delay, d1	4.8	5.0		5.2	5.8	5.3	8.1	8.5		8.8	8.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.0		0.1	0.2	0.1	0.0	0.3		0.8	0.7	
Delay (s)	4.8	5.0		5.3	6.0	5.4	8.1	8.8		9.6	9.4	
Level of Service	A	A		A	A	A	A	A		A	A	
Approach Delay (s)		5.0			5.8			8.8			9.5	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	29.3	Sum of lost time (s)	9.6
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		

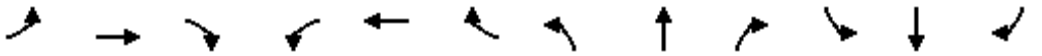
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	35	12	44	60	11	17
Future Volume (Veh/h)	35	12	44	60	11	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	13	48	65	12	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			51		206	44
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			51		206	44
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		98	98
cM capacity (veh/h)			1555		759	1025

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	51	113	30
Volume Left	0	48	12
Volume Right	13	0	18
cSH	1700	1555	899
Volume to Capacity	0.03	0.03	0.03
Queue Length 95th (ft)	0	2	3
Control Delay (s)	0.0	3.3	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	3.3	9.1
Approach LOS			A

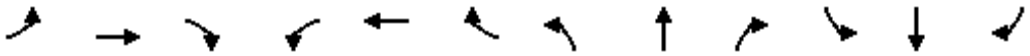
Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	22.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	115	21	0	0	0	23	230	99	37	261	39
Future Volume (vph)	16	115	21	0	0	0	23	230	99	37	261	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Lane Util. Factor	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99					1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98					1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1805					1770	1863	1553	1770	1863	1521
Flt Permitted	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1805					1770	1863	1553	1770	1863	1521
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	125	23	0	0	0	25	250	108	40	284	42
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	82	0	0	31
Lane Group Flow (vph)	17	137	0	0	0	0	25	250	26	40	284	11
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	18.0	18.0					4.0	11.1	11.1	4.8	11.9	11.9
Effective Green, g (s)	18.0	18.0					4.0	11.1	11.1	4.8	11.9	11.9
Actuated g/C Ratio	0.38	0.38					0.09	0.24	0.24	0.10	0.25	0.25
Clearance Time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Vehicle Extension (s)	3.0	3.0					3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	679	692					150	440	367	181	472	385
v/s Ratio Prot	0.01	c0.08					0.01	0.13		c0.02	c0.15	
v/s Ratio Perm									0.02			0.01
v/c Ratio	0.03	0.20					0.17	0.57	0.07	0.22	0.60	0.03
Uniform Delay, d1	9.0	9.6					19.9	15.8	13.9	19.3	15.4	13.2
Progression Factor	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.6					2.4	2.0	0.1	2.8	2.5	0.0
Delay (s)	9.1	10.3					22.3	17.8	14.0	22.1	17.9	13.2
Level of Service	A	B					C	B	B	C	B	B
Approach Delay (s)		10.2			0.0			17.0			17.8	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	46.9	Sum of lost time (s)	13.0
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

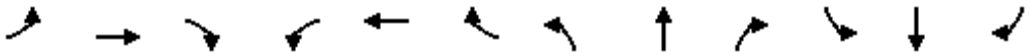
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	240	7	0	0	0	0	10	15	9	7	0
Future Volume (Veh/h)	5	240	7	0	0	0	0	10	15	9	7	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	261	8	0	0	0	0	11	16	10	8	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			269			279	275	134	162	279	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			269			279	275	134	162	279	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	98	98	99	99	100
cM capacity (veh/h)	1622			1292			644	629	890	761	626	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	136	138	27	18
Volume Left	5	0	0	10
Volume Right	0	8	16	0
cSH	1622	1700	761	695
Volume to Capacity	0.00	0.08	0.04	0.03
Queue Length 95th (ft)	0	0	3	2
Control Delay (s)	0.3	0.0	9.9	10.3
Lane LOS	A		A	B
Approach Delay (s)	0.1		9.9	10.3
Approach LOS			A	B

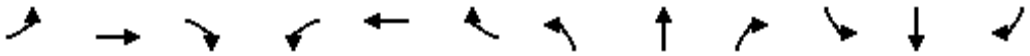
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	242	3	0	0	0	0	14	10	13	15	0
Future Volume (vph)	17	242	3	0	0	0	0	14	10	13	15	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	263	3	0	0	0	0	15	11	14	16	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	150	135	26	30
Volume Left (vph)	18	0	0	14
Volume Right (vph)	0	3	11	0
Hadj (s)	0.09	0.02	-0.22	0.13
Departure Headway (s)	4.7	4.7	4.4	4.7
Degree Utilization, x	0.20	0.17	0.03	0.04
Capacity (veh/h)	751	758	778	719
Control Delay (s)	7.7	7.4	7.5	7.9
Approach Delay (s)	7.6		7.5	7.9
Approach LOS	A		A	A

Intersection Summary				
Delay	7.6			
Level of Service	A			
Intersection Capacity Utilization	22.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	142	122	1	4	0	3	0	17	9	0	0	0
Future Volume (vph)	142	122	1	4	0	3	0	17	9	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	154	133	1	4	0	3	0	18	10	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	154	134	7	28
Volume Left (vph)	154	0	4	0
Volume Right (vph)	0	1	3	10
Hadj (s)	0.53	0.03	-0.11	-0.18
Departure Headway (s)	5.1	4.6	4.2	4.4
Degree Utilization, x	0.22	0.17	0.01	0.03
Capacity (veh/h)	698	769	833	773
Control Delay (s)	8.3	7.3	7.3	7.5
Approach Delay (s)	7.9		7.3	7.5
Approach LOS	A		A	A

Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	22.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	13	0	0	11	13	263	7	5	272	6
Future Volume (Veh/h)	0	0	13	0	0	11	13	263	7	5	272	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	14	0	0	12	14	286	8	5	296	7
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			440	
pX, platoon unblocked												
vC, conflicting volume	644	646	306	645	645	298	310			301		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	644	646	306	645	645	298	310			301		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	98	99			100		
cM capacity (veh/h)	370	380	729	368	380	737	1243			1253		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	14	12	14	294	5	303
Volume Left	0	0	14	0	5	0
Volume Right	14	12	0	8	0	7
cSH	729	737	1243	1700	1253	1700
Volume to Capacity	0.02	0.02	0.01	0.17	0.00	0.18
Queue Length 95th (ft)	1	1	1	0	0	0
Control Delay (s)	10.0	10.0	7.9	0.0	7.9	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	10.0	10.0	0.4		0.1	
Approach LOS	B	A				

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	24.7%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	4	1	7	0	15	3	3	0	5	278	8	0	2	290	5
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	4	1	8	0	17	3	3	0	6	308	9	0	2	322	6
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		13			23			323			330	
Entry Volume veh/h		13			23			317			324	
Circulating Flow (Vc), pc/h	341			318			7			26		
Exiting Flow (Vex), pc/h	12			15			315			347		
Capacity (cPCE), pc/h		804			822			1122			1101	
Capacity (c), veh/h		788			806			1100			1079	
v/c Ratio (X)		0.02			0.03			0.29			0.30	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.7			4.7			6.0			6.3	
Lane LOS		A			A			A			A	
95% Queue		0.0			0.1			1.2			1.3	
Approach Delay, s/veh	4.7			4.7			6.0			6.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.1						A					

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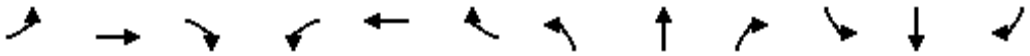
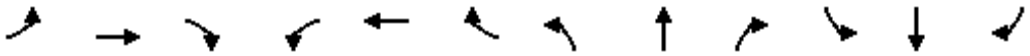


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	33	29	13	4	34	5	69	20	40	47	1
Future Volume (vph)	25	33	29	13	4	34	5	69	20	40	47	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	36	32	14	4	37	5	75	22	43	51	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	95	55	102	95
Volume Left (vph)	27	14	5	43
Volume Right (vph)	32	37	22	1
Hadj (s)	-0.11	-0.32	-0.09	0.12
Departure Headway (s)	4.3	4.1	4.3	4.5
Degree Utilization, x	0.11	0.06	0.12	0.12
Capacity (veh/h)	797	813	807	765
Control Delay (s)	7.8	7.4	7.8	8.1
Approach Delay (s)	7.8	7.4	7.8	8.1
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	24.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	126	10	2	58	10	5	12	13	14	17	7
Future Volume (Veh/h)	5	126	10	2	58	10	5	12	13	14	17	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	137	11	2	63	11	5	13	14	15	18	8
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	88			155			250	252	150	260	252	84
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88			155			250	252	150	260	252	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	98	98	98	97	99
cM capacity (veh/h)	1490			1417			667	637	892	653	637	964

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	153	76	32	41
Volume Left	5	2	5	15
Volume Right	11	11	14	8
cSH	1490	1417	734	689
Volume to Capacity	0.00	0.00	0.04	0.06
Queue Length 95th (ft)	0	0	3	5
Control Delay (s)	0.3	0.2	10.1	10.6
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.2	10.1	10.6
Approach LOS			B	B

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	36	26	92	0	42	14	13	0	45	257	30	0	8	283	12
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	40	29	102	0	47	16	14	0	50	285	33	0	9	314	13
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		171			77			368			336	
Entry Volume veh/h		168			75			361			329	
Circulating Flow (Vc), pc/h	370			375			78			113		
Exiting Flow (Vex), pc/h	71			79			339			463		
Capacity (cPCE), pc/h		781			777			1045			1009	
Capacity (c), veh/h		765			761			1025			989	
v/c Ratio (X)		0.22			0.10			0.35			0.33	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.1			5.7			7.2			7.1	
Lane LOS		A			A			A			A	
95% Queue		0.8			0.3			1.6			1.5	
Approach Delay, s/veh	7.1			5.7			7.2			7.1		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	7.0						A					

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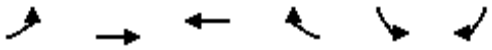
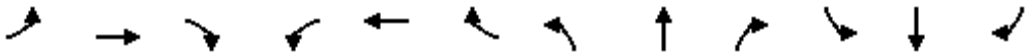


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	60	58	3	10	9
Future Volume (Veh/h)	5	60	58	3	10	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	65	63	3	11	10
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	74				148	74
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	74				148	74
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	99
cM capacity (veh/h)	1515				834	981

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	70	66	21
Volume Left	5	0	11
Volume Right	0	3	10
cSH	1515	1700	898
Volume to Capacity	0.00	0.04	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.6	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.6	0.0	9.1
Approach LOS			A

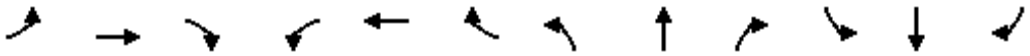
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	56	5	12	53	7	3	4	8	22	1	3
Future Volume (Veh/h)	4	56	5	12	53	7	3	4	8	22	1	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	61	5	13	58	8	3	4	9	24	1	3
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	68			66			165	166	64	172	164	66
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	68			66			165	166	64	172	164	66
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	99	99	97	100	100
cM capacity (veh/h)	1531			1536			787	718	1001	771	719	994

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	70	79	16	28
Volume Left	4	13	3	24
Volume Right	5	8	9	3
cSH	1531	1536	871	788
Volume to Capacity	0.00	0.01	0.02	0.04
Queue Length 95th (ft)	0	1	1	3
Control Delay (s)	0.4	1.3	9.2	9.7
Lane LOS	A	A	A	A
Approach Delay (s)	0.4	1.3	9.2	9.7
Approach LOS			A	A

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	19.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	33	52	20	42	0	28	0	10	0	2	0
Future Volume (vph)	0	33	52	20	42	0	28	0	10	0	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	36	57	22	46	0	30	0	11	0	2	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	93	68	41	2
Volume Left (vph)	0	22	30	0
Volume Right (vph)	57	0	11	0
Hadj (s)	-0.33	0.10	0.02	0.03
Departure Headway (s)	3.7	4.2	4.3	4.3
Degree Utilization, x	0.10	0.08	0.05	0.00
Capacity (veh/h)	945	846	808	798
Control Delay (s)	7.1	7.5	7.5	7.3
Approach Delay (s)	7.1	7.5	7.5	7.3
Approach LOS	A	A	A	A

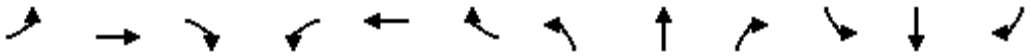
Intersection Summary				
Delay	7.3			
Level of Service	A			
Intersection Capacity Utilization	25.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	32	46	51	20	54	61
Future Volume (vph)	32	46	51	20	54	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	50	55	22	59	66

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	85	77	125
Volume Left (vph)	35	0	59
Volume Right (vph)	50	22	0
Hadj (s)	-0.24	-0.14	0.13
Departure Headway (s)	4.1	4.1	4.3
Degree Utilization, x	0.10	0.09	0.15
Capacity (veh/h)	834	851	818
Control Delay (s)	7.5	7.5	8.0
Approach Delay (s)	7.5	7.5	8.0
Approach LOS	A	A	A

Intersection Summary			
Delay	7.7		
Level of Service	A		
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	132	1	6	106	22	6	7	11	22	11	5
Future Volume (Veh/h)	4	132	1	6	106	22	6	7	11	22	11	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	143	1	7	115	24	7	8	12	24	12	5
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.96						0.96	0.96		0.96	0.96	0.96
vC, conflicting volume	142			155			318	318	162	320	307	134
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	93			155			276	276	162	277	264	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	99	99	96	98	99
cM capacity (veh/h)	1446			1412			623	598	868	621	607	935

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	148	146	27	41
Volume Left	4	7	7	24
Volume Right	1	24	12	5
cSH	1446	1412	702	643
Volume to Capacity	0.00	0.00	0.04	0.06
Queue Length 95th (ft)	0	0	3	5
Control Delay (s)	0.2	0.4	10.3	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.4	10.3	11.0
Approach LOS			B	B

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Oceanside Blvd
E/W Street Name	Oceanside Boulevard
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	15	97	52	0	113	98	109	0	27	216	60	0	119	274	11
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	17	108	58	0	125	109	121	0	30	239	67	0	132	304	12
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		183			355			336			448	
Entry Volume veh/h		179			348			329			439	
Circulating Flow (Vc), pc/h		561			286			257			264	
Exiting Flow (Vex), pc/h		307			151			377			487	
Capacity (cPCE), pc/h		645			849			874			868	
Capacity (c), veh/h		632			832			857			851	
v/c Ratio (X)		0.28			0.42			0.38			0.52	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.4			9.5			8.7			11.2	
Lane LOS		A			A			A			B	
95% Queue		1.2			2.1			1.8			3.0	
Approach Delay, s/veh	9.4			9.5			8.7			11.2		
Approach LOS	A			A			A			B		
Intersection Delay, s/veh / LOS	9.9						A					

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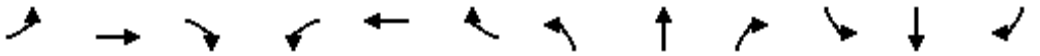
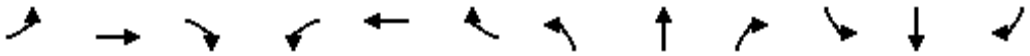


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	274	0	16	353	28	8	5	34	86	8	16
Future Volume (vph)	4	274	0	16	353	28	8	5	34	86	8	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3539		1765	3497			3095			1781	1551
Flt Permitted	0.82	1.00		0.82	1.00			0.94			1.00	1.00
Satd. Flow (perm)	1521	3539		1517	3497			2927			1862	1551
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	298	0	17	384	30	9	5	37	93	9	17
RTOR Reduction (vph)	0	0	0	0	13	0	0	31	0	0	0	14
Lane Group Flow (vph)	4	298	0	17	401	0	0	20	0	0	102	3
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	4.9	4.9		4.9	4.9			2.6			2.6	2.6
Effective Green, g (s)	4.9	4.9		4.9	4.9			2.6			2.6	2.6
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.15			0.15	0.15
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	438	1020		437	1007			447			284	237
v/s Ratio Prot		0.08			c0.11							
v/s Ratio Perm	0.00			0.01				0.01			c0.05	0.00
v/c Ratio	0.01	0.29		0.04	0.40			0.04			0.36	0.01
Uniform Delay, d1	4.3	4.7		4.4	4.9			6.1			6.5	6.1
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.0	0.2		0.0	0.3			0.1			1.1	0.0
Delay (s)	4.3	4.9		4.4	5.1			6.2			7.5	6.1
Level of Service	A	A		A	A			A			A	A
Approach Delay (s)		4.9			5.1			6.2			7.3	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	17.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

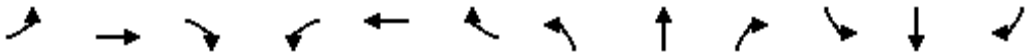
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	8	13	13	5	48	2	292	26	40	394	13
Future Volume (vph)	19	8	13	13	5	48	2	292	26	40	394	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1728			1794	1557	1770	3489		1770	3519	
Flt Permitted		1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1769			1860	1557	1770	3489		1770	3519	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	9	14	14	5	52	2	317	28	43	428	14
RTOR Reduction (vph)	0	13	0	0	0	48	0	8	0	0	3	0
Lane Group Flow (vph)	0	31	0	0	19	4	2	337	0	43	439	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		2.6			2.6	2.6	0.6	17.4		0.6	17.4	
Effective Green, g (s)		2.6			2.6	2.6	0.6	17.4		0.6	17.4	
Actuated g/C Ratio		0.08			0.08	0.08	0.02	0.51		0.02	0.51	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		134			140	118	30	1769		30	1785	
v/s Ratio Prot							0.00	0.10		c0.02	c0.12	
v/s Ratio Perm		c0.02			0.01	0.00						
v/c Ratio		0.23			0.14	0.03	0.07	0.19		1.43	0.25	
Uniform Delay, d1		14.9			14.8	14.7	16.6	4.6		16.8	4.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.2	0.0	0.9	0.1		317.1	0.1	
Delay (s)		15.2			15.0	14.7	17.5	4.7		333.9	4.8	
Level of Service		B			B	B	B	A		F	A	
Approach Delay (s)		15.2			14.8			4.7			34.0	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	34.3	Sum of lost time (s)	13.7
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

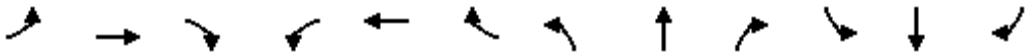
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	60	7	11	52	0	6	0	9	0	0	0
Future Volume (Veh/h)	0	60	7	11	52	0	6	0	9	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	65	8	12	57	0	7	0	10	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	57			73			150	150	69	160	154	57
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	57			73			150	150	69	160	154	57
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	100	99	100	100	100
cM capacity (veh/h)	1547			1527			813	736	994	793	732	1009

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	73	69	17	0
Volume Left	0	12	7	0
Volume Right	8	0	10	0
cSH	1547	1527	910	1700
Volume to Capacity	0.00	0.01	0.02	0.00
Queue Length 95th (ft)	0	1	1	0
Control Delay (s)	0.0	1.3	9.0	0.0
Lane LOS		A	A	A
Approach Delay (s)	0.0	1.3	9.0	0.0
Approach LOS			A	A

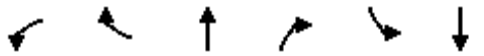
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	20.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	28	4	1	20	1	7	0	3	1	0	1
Future Volume (Veh/h)	1	28	4	1	20	1	7	0	3	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	30	4	1	22	1	8	0	3	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	23			34			60	59	32	62	60	22
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	23			34			60	59	32	62	60	22
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	100	100	100	100
cM capacity (veh/h)	1592			1578			935	831	1042	930	829	1054

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	35	24	11	2
Volume Left	1	1	8	1
Volume Right	4	1	3	1
cSH	1592	1578	962	988
Volume to Capacity	0.00	0.00	0.01	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.2	0.3	8.8	8.6
Lane LOS	A	A	A	A
Approach Delay (s)	0.2	0.3	8.8	8.6
Approach LOS			A	A

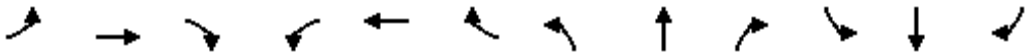
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	16	54	6	16	67	6
Future Volume (vph)	16	54	6	16	67	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	59	7	17	73	7

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	76	24	80
Volume Left (vph)	17	0	73
Volume Right (vph)	59	17	0
Hadj (s)	-0.39	-0.39	0.22
Departure Headway (s)	3.7	3.7	4.3
Degree Utilization, x	0.08	0.02	0.10
Capacity (veh/h)	933	927	820
Control Delay (s)	7.1	6.8	7.7
Approach Delay (s)	7.1	6.8	7.7
Approach LOS	A	A	A

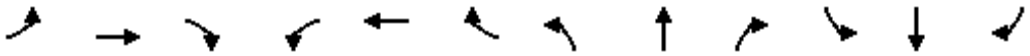
Intersection Summary			
Delay	7.3		
Level of Service	A		
Intersection Capacity Utilization	21.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	101	45	8	67	2	34	5	8	9	6	3
Future Volume (Veh/h)	2	101	45	8	67	2	34	5	8	9	6	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	110	49	9	73	2	37	5	9	10	7	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	75			159			237	232	134	242	255	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	75			159			237	232	134	242	255	74
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			95	99	99	99	99	100
cM capacity (veh/h)	1524			1420			705	663	914	697	644	988

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	161	84	51	20
Volume Left	2	9	37	10
Volume Right	49	2	9	3
cSH	1524	1420	730	708
Volume to Capacity	0.00	0.01	0.07	0.03
Queue Length 95th (ft)	0	0	6	2
Control Delay (s)	0.1	0.9	10.3	10.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.9	10.3	10.2
Approach LOS			B	B

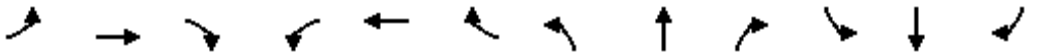
Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	116	7	5	72	10	2	3	14	4	4	3
Future Volume (Veh/h)	0	116	7	5	72	10	2	3	14	4	4	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	126	8	5	78	11	2	3	15	4	4	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	89			134			228	229	130	240	228	84
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			134			228	229	130	240	228	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	99	99	100
cM capacity (veh/h)	1506			1451			719	668	920	698	670	976

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	134	94	20	11
Volume Left	0	5	2	4
Volume Right	8	11	15	3
cSH	1506	1451	848	744
Volume to Capacity	0.00	0.00	0.02	0.01
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	0.4	9.3	9.9
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.4	9.3	9.9
Approach LOS			A	A

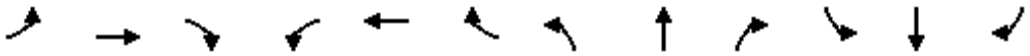
Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	18.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	69	45	35	32	17	57	269	32	40	295	11
Future Volume (vph)	24	69	45	35	32	17	57	269	32	40	295	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.96			0.97		1.00	0.98		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1765			1776		1770	3482		1770	3520	
Flt Permitted		0.92			0.89		0.95	1.00		0.55	1.00	
Satd. Flow (perm)		1635			1621		1770	3482		1032	3520	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	75	49	38	35	18	62	292	35	43	321	12
RTOR Reduction (vph)	0	29	0	0	15	0	0	13	0	0	3	0
Lane Group Flow (vph)	0	121	0	0	76	0	62	314	0	43	330	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		5.2			4.8		2.2	21.9		15.5	15.5	
Effective Green, g (s)		5.2			4.8		2.2	21.9		15.5	15.5	
Actuated g/C Ratio		0.14			0.13		0.06	0.60		0.42	0.42	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		231			212		106	2077		435	1486	
v/s Ratio Prot							c0.04	0.09			c0.09	
v/s Ratio Perm		c0.07			0.05					0.04		
v/c Ratio		0.52			0.36		0.58	0.15		0.10	0.22	
Uniform Delay, d1		14.6			14.5		16.8	3.3		6.4	6.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.1			1.2		5.2	0.0		0.1	0.1	
Delay (s)		16.7			15.8		22.0	3.3		6.5	6.8	
Level of Service		B			B		C	A		A	A	
Approach Delay (s)		16.7			15.8			6.3			6.8	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	36.7	Sum of lost time (s)	14.2
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

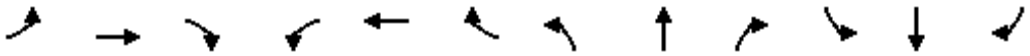
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	136	5	6	77	5	2	6	5	4	5	7
Future Volume (Veh/h)	6	136	5	6	77	5	2	6	5	4	5	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	148	5	7	84	5	2	7	5	4	5	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	89			153			276	268	150	274	268	86
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			153			276	268	150	274	268	86
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	99	99	99	99
cM capacity (veh/h)	1506			1428			662	632	896	665	632	972

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	160	96	14	17
Volume Left	7	7	2	4
Volume Right	5	5	5	8
cSH	1506	1428	712	767
Volume to Capacity	0.00	0.00	0.02	0.02
Queue Length 95th (ft)	0	0	2	2
Control Delay (s)	0.4	0.6	10.2	9.8
Lane LOS	A	A	B	A
Approach Delay (s)	0.4	0.6	10.2	9.8
Approach LOS			B	A

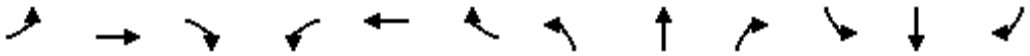
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	152	5	3	93	1	4	8	7	5	4	3
Future Volume (vph)	2	152	5	3	93	1	4	8	7	5	4	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	165	5	3	101	1	4	9	8	5	4	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	172	105	21	12
Volume Left (vph)	2	3	4	5
Volume Right (vph)	5	1	8	3
Hadj (s)	0.02	0.03	-0.16	-0.03
Departure Headway (s)	4.1	4.2	4.4	4.5
Degree Utilization, x	0.20	0.12	0.03	0.01
Capacity (veh/h)	864	846	770	741
Control Delay (s)	8.1	7.8	7.5	7.6
Approach Delay (s)	8.1	7.8	7.5	7.6
Approach LOS	A	A	A	A

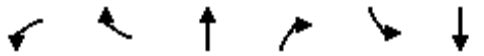
Intersection Summary				
Delay	7.9			
Level of Service	A			
Intersection Capacity Utilization	19.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	173	4	21	79	12	4	33	88	93	6	5
Future Volume (vph)	5	173	4	21	79	12	4	33	88	93	6	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	188	4	23	86	13	4	36	96	101	7	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	197	122	136	113
Volume Left (vph)	5	23	4	101
Volume Right (vph)	4	13	96	5
Hadj (s)	0.03	0.01	-0.38	0.19
Departure Headway (s)	4.7	4.8	4.5	5.0
Degree Utilization, x	0.26	0.16	0.17	0.16
Capacity (veh/h)	719	702	748	660
Control Delay (s)	9.3	8.7	8.4	9.0
Approach Delay (s)	9.3	8.7	8.4	9.0
Approach LOS	A	A	A	A

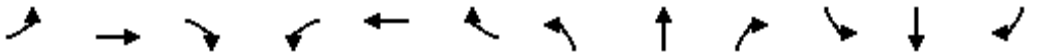
Intersection Summary			
Delay	8.9		
Level of Service	A		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	4	23	14	6	32	28
Future Volume (vph)	4	23	14	6	32	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	25	15	7	35	30

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	29	22	65
Volume Left (vph)	4	0	35
Volume Right (vph)	25	7	0
Hadj (s)	-0.46	-0.16	0.14
Departure Headway (s)	3.6	3.9	4.1
Degree Utilization, x	0.03	0.02	0.07
Capacity (veh/h)	963	909	863
Control Delay (s)	6.7	7.0	7.4
Approach Delay (s)	6.7	7.0	7.4
Approach LOS	A	A	A

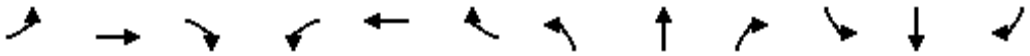
Intersection Summary			
Delay	7.2		
Level of Service	A		
Intersection Capacity Utilization	19.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	81	26	218	33	185	19	163	104	157	230	4
Future Volume (vph)	10	81	26	218	33	185	19	163	104	157	230	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1553		1785	1583	1770	3286		1770	3529	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1553		1785	1583	1770	3286		1770	3529	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	88	28	237	36	201	21	177	113	171	250	4
RTOR Reduction (vph)	0	0	26	0	0	165	0	67	0	0	1	0
Lane Group Flow (vph)	11	88	2	0	273	36	21	223	0	171	253	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	Over	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	5.6	5.6	5.6		16.8	12.0	2.2	14.0		12.0	23.8	
Effective Green, g (s)	5.6	5.6	5.6		16.8	12.0	2.2	14.0		12.0	23.8	
Actuated g/C Ratio	0.08	0.08	0.08		0.25	0.18	0.03	0.21		0.18	0.35	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	146	154	128		444	281	57	681		314	1244	
v/s Ratio Prot	0.01	c0.05			c0.15	0.02	0.01	c0.07		c0.10	0.07	
v/s Ratio Perm			0.00									
v/c Ratio	0.08	0.57	0.02		0.61	0.13	0.37	0.33		0.54	0.20	
Uniform Delay, d1	28.6	29.8	28.4		22.5	23.3	32.0	22.7		25.3	15.2	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	3.2	0.0		2.5	0.1	1.5	0.3		1.0	0.1	
Delay (s)	28.6	33.0	28.4		25.0	23.4	33.4	23.0		26.3	15.3	
Level of Service	C	C	C		C	C	C	C		C	B	
Approach Delay (s)		31.6			24.3			23.7			19.7	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	67.5	Sum of lost time (s)	19.1
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

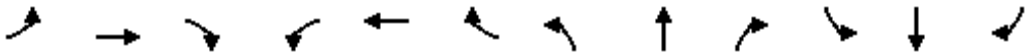
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	300	1	3	447	18	0	0	5	10	0	11
Future Volume (Veh/h)	3	300	1	3	447	18	0	0	5	10	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	326	1	3	486	20	0	0	5	11	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.98			0.98	0.98	0.98	0.98	0.98	
vC, conflicting volume	506			327			846	844	326	840	835	496
vC1, stage 1 conf vol							332	332		502	502	
vC2, stage 2 conf vol							514	512		338	333	
vCu, unblocked vol	506			301			832	830	300	825	820	496
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	98	100	98
cM capacity (veh/h)	1059			1233			468	470	723	480	475	574

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	330	509	5	23
Volume Left	3	3	0	11
Volume Right	1	20	5	12
cSH	1059	1233	723	525
Volume to Capacity	0.00	0.00	0.01	0.04
Queue Length 95th (ft)	0	0	1	3
Control Delay (s)	0.1	0.1	10.0	12.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.1	10.0	12.2
Approach LOS			B	B

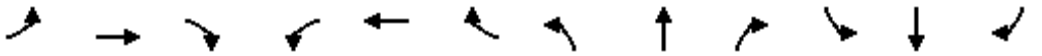
Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	41.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	315	2	6	496	10	2	1	13	12	1	6
Future Volume (Veh/h)	4	315	2	6	496	10	2	1	13	12	1	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	342	2	7	539	11	2	1	14	13	1	7
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked												
vC, conflicting volume	550			345			919	916	344	924	912	546
vC1, stage 1 conf vol							352	352		558	558	
vC2, stage 2 conf vol							567	564		366	353	
vCu, unblocked vol	550			345			919	916	344	924	912	546
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	98	97	100	99
cM capacity (veh/h)	1020			1213			438	444	698	441	446	537

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	348	557	17	21
Volume Left	4	7	2	13
Volume Right	2	11	14	7
cSH	1020	1213	633	469
Volume to Capacity	0.00	0.01	0.03	0.04
Queue Length 95th (ft)	0	0	2	4
Control Delay (s)	0.1	0.2	10.8	13.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.2	10.8	13.0
Approach LOS			B	B

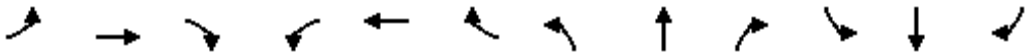
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	40.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	386	1	6	498	66	0	0	5	1	0	10
Future Volume (Veh/h)	14	386	1	6	498	66	0	0	5	1	0	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	420	1	7	541	72	0	0	5	1	0	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	613			421			1016	1078	420	1046	1042	577
vC1, stage 1 conf vol							450	450		591	591	
vC2, stage 2 conf vol							566	627		456	451	
vCu, unblocked vol	613			421			1016	1078	420	1046	1042	577
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			100	100	99	100	100	98
cM capacity (veh/h)	966			1138			406	394	633	405	411	516

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	436	7	613	5	12
Volume Left	15	7	0	0	1
Volume Right	1	0	72	5	11
cSH	966	1138	1700	633	505
Volume to Capacity	0.02	0.01	0.36	0.01	0.02
Queue Length 95th (ft)	1	0	0	1	2
Control Delay (s)	0.5	8.2	0.0	10.7	12.3
Lane LOS	A	A		B	B
Approach Delay (s)	0.5	0.1		10.7	12.3
Approach LOS				B	B

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	33	5	0	5	14	222	4	7	502	5
Future Volume (Veh/h)	0	0	33	5	0	5	14	222	4	7	502	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	36	5	0	5	15	241	4	8	546	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	720	840	548	871	840	122	551			245		
vC1, stage 1 conf vol	564	564		273	273							
vC2, stage 2 conf vol	156	275		598	567							
vCu, unblocked vol	720	840	548	871	840	122	551			245		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	99	100	99	99			99		
cM capacity (veh/h)	451	457	480	378	448	906	1015			1318		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	36	10	15	161	84	8	551
Volume Left	0	5	15	0	0	8	0
Volume Right	36	5	0	0	4	0	5
cSH	480	533	1015	1700	1700	1318	1700
Volume to Capacity	0.08	0.02	0.01	0.09	0.05	0.01	0.32
Queue Length 95th (ft)	6	1	1	0	0	0	0
Control Delay (s)	13.1	11.9	8.6	0.0	0.0	7.7	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	13.1	11.9	0.5			0.1	
Approach LOS	B	B					

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	56	8	23	0	30	9	5	0	14	301	4	0	4	295	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	62	9	26	0	33	10	6	0	16	334	4	0	4	327	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		97			49			354			350	
Entry Volume veh/h		95			48			347			343	
Circulating Flow (Vc), pc/h	364			412			75			59		
Exiting Flow (Vex), pc/h	17			45			402			386		
Capacity (cPCE), pc/h		785			748			1048			1065	
Capacity (c), veh/h		770			734			1028			1044	
v/c Ratio (X)		0.12			0.07			0.34			0.33	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.0			5.6			7.0			6.8	
Lane LOS		A			A			A			A	
95% Queue		0.4			0.2			1.5			1.4	
Approach Delay, s/veh	6.0			5.6			7.0			6.8		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.7						A					

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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	275	188	948	561	0	0
Future Volume (veh/h)	275	188	948	561	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863		
Adj Flow Rate, veh/h	299	204	1030	610		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1416	633	1377	3185		
Arrive On Green	0.40	0.40	0.40	0.90		
Sat Flow, veh/h	3632	1583	3442	3632		
Grp Volume(v), veh/h	299	204	1030	610		
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770		
Q Serve(g_s), s	2.2	3.5	10.3	0.8		
Cycle Q Clear(g_c), s	2.2	3.5	10.3	0.8		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1416	633	1377	3185		
V/C Ratio(X)	0.21	0.32	0.75	0.19		
Avail Cap(c_a), veh/h	1416	633	1377	3185		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	7.9	8.3	10.3	0.2		
Incr Delay (d2), s/veh	0.3	1.3	3.8	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.1	1.8	5.4	0.4		
LnGrp Delay(d),s/veh	8.2	9.6	14.0	0.4		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	503			1640		
Approach Delay, s/veh	8.8			9.0		
Approach LOS	A			A		

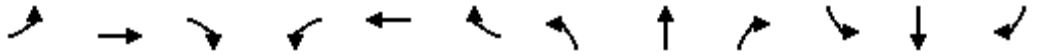
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			20.0	20.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s			12.3	5.5				2.8
Green Ext Time (p_c), s			1.6	1.9				4.7

Intersection Summary	
HCM 2010 Ctrl Delay	8.9
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	466	79	980	1434	79	1
Future Volume (veh/h)	466	79	980	1434	79	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	507	86	1065	1559	86	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	871	390	1112	2232	437	390
Arrive On Green	0.25	0.25	0.32	0.63	0.25	0.00
Sat Flow, veh/h	3632	1583	3442	3632	1774	1583
Grp Volume(v), veh/h	507	86	1065	1559	86	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770	1774	1583
Q Serve(g_s), s	8.2	2.8	19.7	18.9	2.5	0.0
Cycle Q Clear(g_c), s	8.2	2.8	19.7	18.9	2.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	871	390	1112	2232	437	390
V/C Ratio(X)	0.58	0.22	0.96	0.70	0.20	0.00
Avail Cap(c_a), veh/h	871	390	1112	2232	437	390
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.6	19.5	21.6	7.9	19.4	0.0
Incr Delay (d2), s/veh	2.8	1.3	18.6	1.8	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	1.4	12.2	9.7	1.3	0.0
LnGrp Delay(d),s/veh	24.4	20.8	40.1	9.8	20.4	0.0
LnGrp LOS	C	C	D	A	C	
Approach Vol, veh/h	593			2624	86	
Approach Delay, s/veh	23.9			22.1	20.4	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	25.0	20.0				45.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	21.0	16.0				41.0
Max Q Clear Time (g_c+I1), s		4.5	21.7	10.2				20.9
Green Ext Time (p_c), s		0.1	0.0	1.8				12.2

Intersection Summary	
HCM 2010 Ctrl Delay	22.4
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	502	6	183	871	718	17	0	219	90	71	82
Future Volume (veh/h)	0	502	6	183	871	718	17	0	219	90	71	82
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	1863	1863	0	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	546	7	199	947	0	18	0	238	88	92	89
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1101	14	273	1906	853	0	0	0	546	573	487
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3672	46	1774	3539	1583		0		1774	1863	1583
Grp Volume(v), veh/h	0	270	283	199	947	0		0.0		88	92	89
Grp Sat Flow(s),veh/h/ln	0	1770	1855	1774	1770	1583				1774	1863	1583
Q Serve(g_s), s	0.0	6.5	6.5	5.6	8.8	0.0				1.9	1.9	2.1
Cycle Q Clear(g_c), s	0.0	6.5	6.5	5.6	8.8	0.0				1.9	1.9	2.1
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	544	571	273	1906	853				546	573	487
V/C Ratio(X)	0.00	0.50	0.50	0.73	0.50	0.00				0.16	0.16	0.18
Avail Cap(c_a), veh/h	0	544	571	273	1906	853				546	573	487
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	14.7	14.7	21.0	7.6	0.0				13.1	13.1	13.2
Incr Delay (d2), s/veh	0.0	3.2	3.1	15.7	0.9	0.0				0.6	0.6	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.6	3.8	3.9	4.5	0.0				1.0	1.0	1.1
LnGrp Delay(d),s/veh	0.0	17.9	17.8	36.7	8.5	0.0				13.7	13.7	14.0
LnGrp LOS		B	B	D	A					B	B	B
Approach Vol, veh/h		553			1146						269	
Approach Delay, s/veh		17.8			13.4						13.8	
Approach LOS		B			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			7.6	8.5		4.1		10.8
Green Ext Time (p_c), s			0.0	2.0		0.8		6.4

Intersection Summary	
HCM 2010 Ctrl Delay	14.7
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	325	393	13	22	517	506	24	29	48	197	5	80
Future Volume (veh/h)	325	393	13	22	517	506	24	29	48	197	5	80
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	353	427	14	24	562	550	26	32	52	153	90	87
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	355	1180	39	111	708	633	163	201	317	355	174	169
Arrive On Green	0.20	0.34	0.34	0.06	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1774	3498	114	1774	3539	1583	817	1005	1583	1774	872	843
Grp Volume(v), veh/h	353	216	225	24	562	550	58	0	52	153	0	177
Grp Sat Flow(s),veh/h/ln	1774	1770	1843	1774	1770	1583	1822	0	1583	1774	0	1714
Q Serve(g_s), s	15.9	7.4	7.4	1.0	12.1	16.0	2.1	0.0	2.2	6.0	0.0	7.4
Cycle Q Clear(g_c), s	15.9	7.4	7.4	1.0	12.1	16.0	2.1	0.0	2.2	6.0	0.0	7.4
Prop In Lane	1.00		0.06	1.00		1.00	0.45		1.00	1.00		0.49
Lane Grp Cap(c), veh/h	355	597	622	111	708	633	364	0	317	355	0	343
V/C Ratio(X)	0.99	0.36	0.36	0.22	0.79	0.87	0.16	0.00	0.16	0.43	0.00	0.52
Avail Cap(c_a), veh/h	355	597	622	111	708	633	364	0	317	355	0	343
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.0	20.0	20.0	35.6	30.4	19.2	26.4	0.0	26.5	28.0	0.0	28.5
Incr Delay (d2), s/veh	46.5	1.7	1.6	4.4	8.9	15.0	0.9	0.0	1.1	3.8	0.0	5.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.3	3.9	4.0	0.6	6.7	14.7	1.2	0.0	1.1	3.3	0.0	4.0
LnGrp Delay(d),s/veh	78.5	21.7	21.6	40.1	39.4	34.2	27.4	0.0	27.6	31.8	0.0	34.0
LnGrp LOS	E	C	C	D	D	C	C		C	C		C
Approach Vol, veh/h		794			1136			110			330	
Approach Delay, s/veh		46.9			36.9			27.5			33.0	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	31.0		20.0	20.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	27.0		16.0	16.0	16.0
Max Q Clear Time (g_c+I1), s		4.2	3.0	9.4		9.4	17.9	18.0
Green Ext Time (p_c), s		0.3	0.0	2.4		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	39.3
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	378	143	43	748	257	127	74	41	316	155	223
Future Volume (veh/h)	86	378	143	43	748	257	127	74	41	316	155	223
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	93	411	155	47	813	279	109	121	45	256	290	242
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	101	613	229	101	860	385	431	452	385	405	426	362
Arrive On Green	0.06	0.24	0.24	0.06	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23
Sat Flow, veh/h	1774	2525	942	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	93	287	279	47	813	279	109	121	45	256	290	242
Grp Sat Flow(s),veh/h/ln	1774	1770	1697	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.7	10.2	10.4	1.8	15.8	11.3	3.5	3.7	1.6	9.1	10.0	9.7
Cycle Q Clear(g_c), s	3.7	10.2	10.4	1.8	15.8	11.3	3.5	3.7	1.6	9.1	10.0	9.7
Prop In Lane	1.00		0.56	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	101	430	412	101	860	385	431	452	385	405	426	362
V/C Ratio(X)	0.92	0.67	0.68	0.46	0.95	0.73	0.25	0.27	0.12	0.63	0.68	0.67
Avail Cap(c_a), veh/h	101	430	412	101	860	385	431	452	385	405	426	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.8	23.9	24.0	32.0	26.0	24.4	21.4	21.5	20.7	24.3	24.7	24.6
Incr Delay (d2), s/veh	69.0	8.0	8.7	14.5	20.1	11.3	1.4	1.4	0.6	7.3	8.5	9.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	6.0	5.9	1.3	10.1	6.2	1.9	2.1	0.7	5.2	6.1	5.2
LnGrp Delay(d),s/veh	101.9	31.9	32.7	46.4	46.1	35.7	22.8	22.9	21.3	31.6	33.2	34.0
LnGrp LOS	F	C	C	D	D	D	C	C	C	C	C	C
Approach Vol, veh/h		659			1139			275			788	
Approach Delay, s/veh		42.1			43.6			22.6			32.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	8.0	21.0		20.0	8.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	17.0		16.0	4.0	17.0
Max Q Clear Time (g_c+I1), s		5.7	3.8	12.4		12.0	5.7	17.8
Green Ext Time (p_c), s		0.8	0.0	1.4		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	38.3
HCM 2010 LOS	D

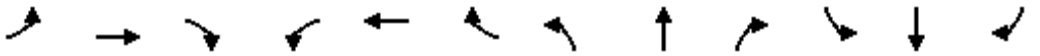
Notes

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	43	93	13	62	70	165	3	84	22	0	0	0
Future Vol, veh/h	43	93	13	62	70	165	3	84	22	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	101	14	67	76	179	3	91	24	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.8	9.5	8.8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	3%	29%	21%
Vol Thru, %	77%	62%	24%
Vol Right, %	20%	9%	56%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	109	149	297
LT Vol	3	43	62
Through Vol	84	93	70
RT Vol	22	13	165
Lane Flow Rate	118	162	323
Geometry Grp	1	1	1
Degree of Util (X)	0.16	0.205	0.369
Departure Headway (Hd)	4.852	4.559	4.119
Convergence, Y/N	Yes	Yes	Yes
Cap	738	787	875
Service Time	2.887	2.588	2.141
HCM Lane V/C Ratio	0.16	0.206	0.369
HCM Control Delay	8.8	8.8	9.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.6	0.8	1.7



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	258	103	163	362	295	1429	180	29	136	103	57	74
Future Volume (vph)	258	103	163	362	295	1429	180	29	136	103	57	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3030	1441		1786	1583		1805	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3030	1441		1786	1583		1805	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	280	112	177	393	321	1553	196	32	148	112	62	80
RTOR Reduction (vph)	0	0	150	0	500	573	0	0	114	0	0	65
Lane Group Flow (vph)	280	112	27	393	598	203	0	228	34	0	174	15
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.0	13.3	13.3	17.0	19.9	19.9		20.2	20.2		16.0	16.0
Effective Green, g (s)	14.0	13.3	13.3	17.0	19.9	19.9		20.2	20.2		16.0	16.0
Actuated g/C Ratio	0.16	0.15	0.15	0.19	0.23	0.23		0.23	0.23		0.18	0.18
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	283	283	241	344	690	328		413	366		330	290
v/s Ratio Prot	0.16	0.06		c0.22	c0.20			c0.13			c0.10	
v/s Ratio Perm			0.02			0.14			0.02			0.01
v/c Ratio	0.99	0.40	0.11	1.14	0.87	0.62		0.55	0.09		0.53	0.05
Uniform Delay, d1	36.6	33.4	31.9	35.1	32.4	30.3		29.6	26.4		32.2	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	50.0	0.3	0.1	93.0	10.7	2.4		5.2	0.5		5.9	0.3
Delay (s)	86.6	33.7	32.0	128.2	43.1	32.7		34.8	26.9		38.2	29.7
Level of Service	F	C	C	F	D	C		C	C		D	C
Approach Delay (s)		59.2			54.3			31.7			35.5	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	51.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	20.8
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	5	0	526	0	205	0	5	280	536	0	353	359	2
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	6	0	583	0	223	0	6	310	594	0	391	398	2
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		6		0	583	223		316	594	391	400	
Entry Volume veh/h		6		0	572	223		310	582	383	392	
Circulating Flow (Vc), pc/h	1372			316			391			589		
Exiting Flow (Vex), pc/h	391			8			310			987		
Capacity (cPCE), pc/h		287		892	906			859		726	748	
Capacity (c), veh/h		281		874	888			843		712	734	
v/c Ratio (X)		0.02		0.00	0.64			0.37		0.54	0.53	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		13.2		4.1	14.3	0.0		8.6	0.0	13.5	13.1	
Lane LOS		B		A	B	A		A	A	B	B	
95% Queue		0.1		0.0	4.8			1.7		3.2	3.2	
Approach Delay, s/veh	13.2			10.3			3.0			13.3		
Approach LOS	B			B			A			B		
Intersection Delay, s/veh / LOS	8.6						A					

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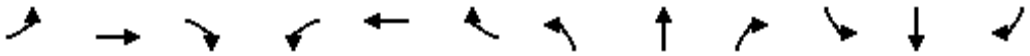

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	38	26	62	65	100	41	78	65	115	106	25
Future Volume (vph)	1	38	26	62	65	100	41	78	65	115	106	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	41	28	67	71	109	45	85	71	125	115	27

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	70	247	201	267
Volume Left (vph)	1	67	45	125
Volume Right (vph)	28	109	71	27
Hadj (s)	-0.20	-0.18	-0.13	0.07
Departure Headway (s)	5.3	5.0	5.0	5.1
Degree Utilization, x	0.10	0.35	0.28	0.38
Capacity (veh/h)	592	658	668	662
Control Delay (s)	8.9	10.7	9.9	11.2
Approach Delay (s)	8.9	10.7	9.9	11.2
Approach LOS	A	B	A	B

Intersection Summary				
Delay	10.5			
Level of Service	B			
Intersection Capacity Utilization	52.2%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Surfrider Way
E/W Street Name	Surfrider Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1
Lane Assignment			LTR				LTR				LTR		LT		R	
Volume (V), veh/h	0	162	50	68	0	11	44	27	0	48	554	17	0	43	560	117
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	180	55	75	0	12	49	30	0	53	614	19	0	48	621	130
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929		5.1929	5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		310			91			686		669	130	
Entry Volume veh/h		304			89			673		656	127	
Circulating Flow (Vc), pc/h	681			847			283			114		
Exiting Flow (Vex), pc/h	122			232			824			708		
Capacity (cPCE), pc/h		572			484			851		1008	1008	
Capacity (c), veh/h		561			475			835		988	988	
v/c Ratio (X)		0.54			0.19			0.81		0.66	0.13	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		16.5			10.3			23.6		13.8	4.8	
Lane LOS		C			B			C		B	A	
95% Queue		3.2			0.7			8.7		5.3	0.4	
Approach Delay, s/veh	16.5			10.3			23.6			12.4		
Approach LOS	C			B			C			B		
Intersection Delay, s/veh / LOS	17.0						C					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	26	29	23	0	29	34	65	0	19	548	53	0	36	572	22
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	29	32	26	0	32	38	72	0	21	608	59	0	40	634	24
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		87			142			688			698	
Entry Volume veh/h		85			139			675			684	
Circulating Flow (Vc), pc/h	706			658			101			91		
Exiting Flow (Vex), pc/h	131			83			709			692		
Capacity (cPCE), pc/h		558			585			1021			1032	
Capacity (c), veh/h		547			574			1001			1011	
v/c Ratio (X)		0.16			0.24			0.67			0.68	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.6			9.5			14.0			14.0	
Lane LOS		A			A			B			B	
95% Queue		0.5			0.9			5.5			5.5	
Approach Delay, s/veh	8.6			9.5			14.0			14.0		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	13.3						B					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/12/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	38	30	42	0	18	30	51	0	32	531	42	0	23	531	72
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	42	33	47	0	20	33	57	0	35	589	47	0	26	589	80
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		122			110			671			695	
Entry Volume veh/h		120			108			658			681	
Circulating Flow (Vc), pc/h	635			666			101			88		
Exiting Flow (Vex), pc/h	106			148			688			656		
Capacity (cPCE), pc/h		599			581			1021			1035	
Capacity (c), veh/h		587			569			1001			1015	
v/c Ratio (X)		0.20			0.19			0.66			0.67	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.7			8.7			13.5			13.8	
Lane LOS		A			A			B			B	
95% Queue		0.8			0.7			5.1			5.4	
Approach Delay, s/veh	8.7			8.7			13.5			13.8		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	12.9						B					

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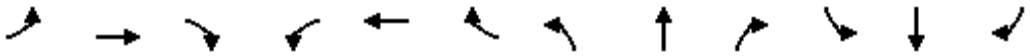
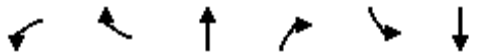


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	32	13	116	107	13	18	40	250	50	18	225	10
Future Volume (vph)	32	13	116	107	13	18	40	250	50	18	225	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	14	126	116	14	20	43	272	54	20	245	11

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	SB 1
Volume Total (vph)	49	126	150	369	276
Volume Left (vph)	35	0	116	43	20
Volume Right (vph)	0	126	20	54	11
Hadj (s)	0.39	-0.67	0.11	-0.03	0.02
Departure Headway (s)	6.9	5.9	6.2	5.3	5.5
Degree Utilization, x	0.09	0.21	0.26	0.54	0.42
Capacity (veh/h)	464	543	511	640	612
Control Delay (s)	9.5	9.2	11.4	14.5	12.5
Approach Delay (s)	9.3		11.4	14.5	12.5
Approach LOS	A		B	B	B

Intersection Summary				
Delay	12.5			
Level of Service	B			
Intersection Capacity Utilization	49.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	181	81	106	126	59	124
Future Volume (vph)	181	81	106	126	59	124
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	197	88	115	137	64	135

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	197	88	252	199
Volume Left (vph)	197	0	0	64
Volume Right (vph)	0	88	137	0
Hadj (s)	0.53	-0.67	-0.29	0.10
Departure Headway (s)	6.1	4.9	4.7	5.1
Degree Utilization, x	0.34	0.12	0.33	0.28
Capacity (veh/h)	555	684	732	665
Control Delay (s)	11.0	7.4	9.9	10.1
Approach Delay (s)	9.9		9.9	10.1
Approach LOS	A		A	B

Intersection Summary			
Delay	10.0		
Level of Service	A		
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Year 2013 No Project

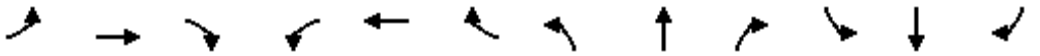
Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #9 Cleveland Street and Mission Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.292
Loss Time (sec):	0	Average Delay (sec/veh):	10.6
Optimal Cycle:	0	Level Of Service:	B

Street Name:	Cleveland Street						Mission Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1 0	0 1		0 0 1!	0 0		1 0 1	1 0		1 0 1	1 0	
Volume Module:												
Base Vol:	43	38	58	72	29	59	28	224	33	93	204	63
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	43	38	58	72	29	59	28	224	33	93	204	63
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	43	38	58	72	29	59	28	224	33	93	204	63
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	43	38	58	72	29	59	28	224	33	93	204	63
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	43	38	58	72	29	59	28	224	33	93	204	63
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.53	0.47	1.00	0.45	0.18	0.37	1.00	1.74	0.26	1.00	1.53	0.47
Final Sat.:	268	237	584	247	99	202	504	961	144	519	872	279
Capacity Analysis Module:												
Vol/Sat:	0.16	0.16	0.10	0.29	0.29	0.29	0.06	0.23	0.23	0.18	0.23	0.23
Crit Moves:	****			****			****			****		
Delay/Veh:	10.6	10.6	9.0	11.6	11.6	11.6	9.9	10.7	10.5	10.7	10.5	10.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	10.6	10.6	9.0	11.6	11.6	11.6	9.9	10.7	10.5	10.7	10.5	10.1
LOS by Move:	B	B	A	B	B	B	A	B	B	B	B	B
ApproachDel:	9.9			11.6			10.6			10.5		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	9.9			11.6			10.6			10.5		
LOS by Appr:	A			B			B			B		
AllWayAvgQ:	0.2	0.2	0.1	0.4	0.4	0.4	0.1	0.3	0.3	0.2	0.3	0.3

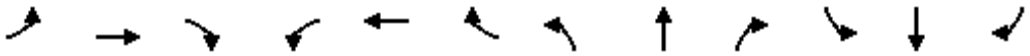
Note: Queue reported is the number of cars per lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	0	65	137	380	121	53	507	0	0	426	61
Future Volume (vph)	43	0	65	137	380	121	53	507	0	0	426	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	0.95		1.00	1.00			0.95	0.95
Frpb, ped/bikes	1.00		0.96	1.00	0.99		1.00	1.00			1.00	0.97
Flpb, ped/bikes	0.99		1.00	0.98	1.00		1.00	1.00			1.00	1.00
Frt	1.00		0.85	1.00	0.96		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1756		1522	1737	3381		1770	1863			1765	1461
Flt Permitted	0.42		1.00	0.95	1.00		0.32	1.00			1.00	1.00
Satd. Flow (perm)	779		1522	1737	3381		589	1863			1765	1461
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	0	71	149	413	132	58	551	0	0	463	66
RTOR Reduction (vph)	0	0	41	0	44	0	0	0	0	0	1	31
Lane Group Flow (vph)	47	0	30	149	501	0	58	551	0	0	469	28
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type	Perm		Perm	Perm	NA		Perm	NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases	4		4	8			2					6
Actuated Green, G (s)	25.5		25.5	25.5	25.5		24.5	24.5			24.5	24.5
Effective Green, g (s)	25.5		25.5	25.5	25.5		24.5	24.5			24.5	24.5
Actuated g/C Ratio	0.42		0.42	0.42	0.42		0.41	0.41			0.41	0.41
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0		4.0	4.0			4.0	4.0
Lane Grp Cap (vph)	331		646	738	1436		240	760			720	596
v/s Ratio Prot					c0.15			c0.30			0.27	
v/s Ratio Perm	0.06		0.02	0.09			0.10					0.02
v/c Ratio	0.14		0.05	0.20	0.35		0.24	0.72			0.65	0.05
Uniform Delay, d1	10.6		10.1	10.8	11.6		11.7	14.9			14.3	10.7
Progression Factor	1.00		1.00	1.00	1.00		0.20	0.21			1.36	2.11
Incremental Delay, d2	0.9		0.1	0.6	0.7		0.3	1.8			1.8	0.0
Delay (s)	11.5		10.3	11.5	12.3		2.7	4.8			21.4	22.7
Level of Service	B		B	B	B		A	A			C	C
Approach Delay (s)		10.7			12.1			4.6			21.5	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	351	3	142	638	268	5	44	477	365	51	25
Future Volume (vph)	15	351	3	142	638	268	5	44	477	365	51	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.86		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	
Satd. Flow (prot)	1770	3535		1770	3539	1583	1770	1607		1681	1684	
Flt Permitted	0.28	1.00		0.51	1.00	1.00	0.60	1.00		0.32	0.42	
Satd. Flow (perm)	529	3535		951	3539	1583	1116	1607		575	736	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	382	3	154	693	291	5	48	518	397	55	27
RTOR Reduction (vph)	0	1	0	0	0	197	0	145	0	0	7	0
Lane Group Flow (vph)	16	384	0	154	693	94	5	421	0	238	234	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	19.8	19.8		19.4	19.4	19.4	31.0	31.0		31.0	31.0	
Effective Green, g (s)	19.8	19.8		19.4	19.4	19.4	31.0	31.0		31.0	31.0	
Actuated g/C Ratio	0.33	0.33		0.32	0.32	0.32	0.52	0.52		0.52	0.52	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	174	1166		307	1144	511	576	830		297	380	
v/s Ratio Prot		0.11			c0.20			0.26				
v/s Ratio Perm	0.03			0.16		0.06	0.00			c0.41	0.32	
v/c Ratio	0.09	0.33		0.50	0.61	0.18	0.01	0.51		0.80	0.62	
Uniform Delay, d1	13.9	15.1		16.4	17.1	14.6	7.0	9.5		12.0	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.2		1.5	1.0	0.2	0.0	2.2		20.0	7.3	
Delay (s)	14.2	15.3		17.9	18.0	14.8	7.1	11.7		31.9	17.6	
Level of Service	B	B		B	B	B	A	B		C	B	
Approach Delay (s)		15.3			17.2			11.7			24.7	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

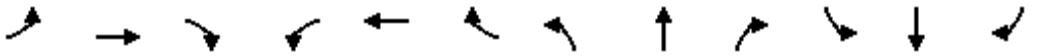
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	177	32	50	126	50	63
Future Volume (Veh/h)	177	32	50	126	50	63
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	192	35	54	137	54	68
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			227		454	210
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			227		454	210
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		90	92
cM capacity (veh/h)			1341		541	831

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	227	191	122
Volume Left	0	54	54
Volume Right	35	0	68
cSH	1700	1341	671
Volume to Capacity	0.13	0.04	0.18
Queue Length 95th (ft)	0	3	16
Control Delay (s)	0.0	2.4	11.5
Lane LOS		A	B
Approach Delay (s)	0.0	2.4	11.5
Approach LOS			B

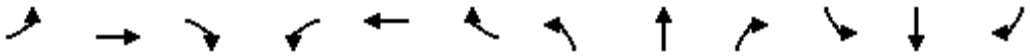
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	365	67	0	0	0	58	651	245	113	479	62
Future Volume (vph)	70	365	67	0	0	0	58	651	245	113	479	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Lane Util. Factor	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99					1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98					1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1803					1770	1863	1552	1770	1863	1515
Flt Permitted	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1803					1770	1863	1552	1770	1863	1515
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	397	73	0	0	0	63	708	266	123	521	67
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	94	0	0	40
Lane Group Flow (vph)	76	459	0	0	0	0	63	708	172	123	521	27
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	18.0	18.0					4.4	23.7	23.7	5.3	24.6	24.6
Effective Green, g (s)	18.0	18.0					4.4	23.7	23.7	5.3	24.6	24.6
Actuated g/C Ratio	0.30	0.30					0.07	0.39	0.39	0.09	0.41	0.41
Clearance Time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Vehicle Extension (s)	3.0	3.0					3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	531	540					129	735	613	156	763	621
v/s Ratio Prot	0.04	c0.25					0.04	c0.38		0.07	c0.28	
v/s Ratio Perm									0.11			0.02
v/c Ratio	0.14	0.85					0.49	0.96	0.28	0.79	0.68	0.04
Uniform Delay, d1	15.4	19.7					26.7	17.7	12.4	26.8	14.5	10.6
Progression Factor	1.00	1.00					0.95	0.85	0.58	0.74	0.53	0.72
Incremental Delay, d2	0.6	15.4					10.9	23.1	1.0	30.4	4.6	0.1
Delay (s)	15.9	35.1					36.3	38.2	8.1	50.4	12.2	7.8
Level of Service	B	D					D	D	A	D	B	A
Approach Delay (s)		32.4			0.0			30.3			18.4	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

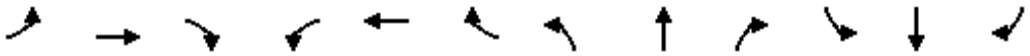
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	677	14	0	0	0	0	8	33	24	18	0
Future Volume (Veh/h)	15	677	14	0	0	0	0	8	33	24	18	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	736	15	0	0	0	0	9	36	26	20	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			751			786	776	376	440	783	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			751			786	776	376	440	783	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	94	94	100
cM capacity (veh/h)	1622			854			267	324	622	458	321	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	384	383	45	46
Volume Left	16	0	0	26
Volume Right	0	15	36	0
cSH	1622	1700	525	386
Volume to Capacity	0.01	0.23	0.09	0.12
Queue Length 95th (ft)	1	0	7	10
Control Delay (s)	0.4	0.0	12.5	15.6
Lane LOS	A		B	C
Approach Delay (s)	0.2		12.5	15.6
Approach LOS			B	C

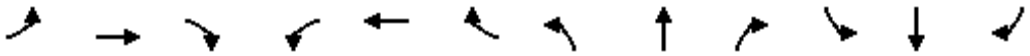
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	26	692	16	0	0	0	0	20	34	33	42	0
Future Volume (vph)	26	692	16	0	0	0	0	20	34	33	42	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	752	17	0	0	0	0	22	37	36	46	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	404	393	59	82
Volume Left (vph)	28	0	0	36
Volume Right (vph)	0	17	37	0
Hadj (s)	0.07	0.00	-0.34	0.12
Departure Headway (s)	5.0	4.9	5.2	5.6
Degree Utilization, x	0.56	0.54	0.09	0.13
Capacity (veh/h)	708	724	646	598
Control Delay (s)	12.9	12.2	8.7	9.5
Approach Delay (s)	12.5		8.7	9.5
Approach LOS	B		A	A

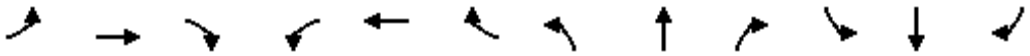
Intersection Summary				
Delay	12.0			
Level of Service	B			
Intersection Capacity Utilization	37.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	377	405	19	6	0	4	0	7	7	0	0	0
Future Volume (vph)	377	405	19	6	0	4	0	7	7	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	410	440	21	7	0	4	0	8	8	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	410	461	11	16
Volume Left (vph)	410	0	7	0
Volume Right (vph)	0	21	4	8
Hadj (s)	0.53	0.00	-0.06	-0.27
Departure Headway (s)	5.1	4.6	4.7	5.2
Degree Utilization, x	0.58	0.58	0.01	0.02
Capacity (veh/h)	704	785	753	652
Control Delay (s)	13.7	12.5	7.7	8.3
Approach Delay (s)	13.1		7.7	8.3
Approach LOS	B		A	A

Intersection Summary			
Delay	12.9		
Level of Service	B		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	37	0	0	11	16	644	16	8	589	17
Future Volume (Veh/h)	0	0	37	0	0	11	16	644	16	8	589	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	40	0	0	12	17	700	17	9	640	18
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			440	
pX, platoon unblocked	0.87	0.87	0.78	0.87	0.87	0.83	0.78			0.83		
vC, conflicting volume	1421	1432	656	1448	1432	716	665			724		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	967	980	422	998	981	556	434			565		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	97	98			99		
cM capacity (veh/h)	190	208	492	171	208	437	877			831		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	40	12	17	717	9	658
Volume Left	0	0	17	0	9	0
Volume Right	40	12	0	17	0	18
cSH	492	437	877	1700	831	1700
Volume to Capacity	0.08	0.03	0.02	0.42	0.01	0.39
Queue Length 95th (ft)	7	2	1	0	1	0
Control Delay (s)	13.0	13.5	9.2	0.0	9.4	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.0	13.5	0.2		0.1	
Approach LOS	B	B				

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	45.2%	ICU Level of Service		A
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	4	0	20	0	21	5	9	0	13	665	14	0	18	604	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	4	0	22	0	23	6	10	0	14	737	16	0	20	670	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		26			39			767			709	
Entry Volume veh/h		25			38			752			695	
Circulating Flow (Vc), pc/h	713			755			24			43		
Exiting Flow (Vex), pc/h	36			39			751			715		
Capacity (cPCE), pc/h		554			531			1103			1082	
Capacity (c), veh/h		543			521			1082			1061	
v/c Ratio (X)		0.05			0.07			0.70			0.65	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.2			7.8			14.0			12.9	
Lane LOS		A			A			B			B	
95% Queue		0.1			0.2			6.0			5.1	
Approach Delay, s/veh	7.2			7.8			14.0			12.9		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	13.2						B					

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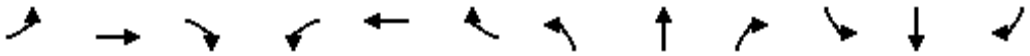
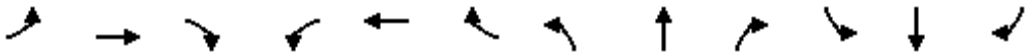


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	57	85	49	45	7	58	7	130	36	69	80	3
Future Volume (vph)	57	85	49	45	7	58	7	130	36	69	80	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	92	53	49	8	63	8	141	39	75	87	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	207	120	188	165
Volume Left (vph)	62	49	8	75
Volume Right (vph)	53	63	39	3
Hadj (s)	-0.06	-0.20	-0.08	0.11
Departure Headway (s)	4.9	4.9	4.9	5.1
Degree Utilization, x	0.28	0.16	0.26	0.23
Capacity (veh/h)	679	666	684	651
Control Delay (s)	9.8	8.9	9.5	9.7
Approach Delay (s)	9.8	8.9	9.5	9.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.5			
Level of Service	A			
Intersection Capacity Utilization	40.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	207	20	9	144	24	19	33	31	19	44	9
Future Volume (Veh/h)	8	207	20	9	144	24	19	33	31	19	44	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	225	22	10	157	26	21	36	34	21	48	10
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	197			254			486	478	243	510	476	185
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	197			254			486	478	243	510	476	185
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			95	92	96	95	90	99
cM capacity (veh/h)	1360			1303			435	471	791	412	472	847

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	256	193	91	79
Volume Left	9	10	21	21
Volume Right	22	26	34	10
cSH	1360	1303	543	481
Volume to Capacity	0.01	0.01	0.17	0.16
Queue Length 95th (ft)	0	1	15	15
Control Delay (s)	0.3	0.5	13.0	14.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.5	13.0	14.0
Approach LOS			B	B

Intersection Summary				
Average Delay	4.0			
Intersection Capacity Utilization	27.4%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	69	61	123	0	57	49	10	0	108	582	62	0	11	582	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	76	68	136	0	63	54	11	0	120	645	69	0	12	645	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		280			128			834			695	
Entry Volume veh/h		275			125			818			681	
Circulating Flow (Vc), pc/h		720			841			156			237	
Exiting Flow (Vex), pc/h		149			212			732			844	
Capacity (cPCE), pc/h		550			487			967			892	
Capacity (c), veh/h		539			478			948			874	
v/c Ratio (X)		0.51			0.26			0.86			0.78	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		15.9			11.5			26.5			20.9	
Lane LOS		C			B			D			C	
95% Queue		2.9			1.0			11.2			8.0	
Approach Delay, s/veh	15.9			11.5			26.5			20.9		
Approach LOS	C			B			D			C		
Intersection Delay, s/veh / LOS	22.0						C					

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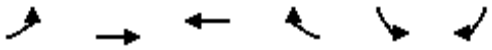
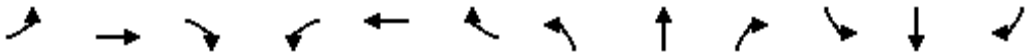


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	125	93	14	21	22
Future Volume (Veh/h)	5	125	93	14	21	22
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	136	101	15	23	24
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	124				264	118
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	124				264	118
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	97
cM capacity (veh/h)	1453				718	927

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	141	116	47
Volume Left	5	0	23
Volume Right	0	15	24
cSH	1453	1700	811
Volume to Capacity	0.00	0.07	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.3	0.0	9.7
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	9.7
Approach LOS			A

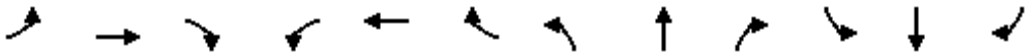
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	129	2	1	86	18	1	1	2	27	0	19
Future Volume (Veh/h)	14	129	2	1	86	18	1	1	2	27	0	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	140	2	1	93	20	1	1	2	29	0	21
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	115			142			299	288	141	280	279	107
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	115			142			299	288	141	280	279	107
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	96	100	98
cM capacity (veh/h)	1471			1441			632	614	907	662	621	944

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	157	114	4	50
Volume Left	15	1	1	29
Volume Right	2	20	2	21
cSH	1471	1441	738	757
Volume to Capacity	0.01	0.00	0.01	0.07
Queue Length 95th (ft)	1	0	0	5
Control Delay (s)	0.8	0.1	9.9	10.1
Lane LOS	A	A	A	B
Approach Delay (s)	0.8	0.1	9.9	10.1
Approach LOS			A	B

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	27.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	79	79	23	57	1	47	1	32	0	1	0
Future Volume (vph)	1	79	79	23	57	1	47	1	32	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	86	86	25	62	1	51	1	35	0	1	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	173	88	87	1
Volume Left (vph)	1	25	51	0
Volume Right (vph)	86	1	35	0
Hadj (s)	-0.26	0.08	-0.09	0.03
Departure Headway (s)	3.9	4.4	4.4	4.6
Degree Utilization, x	0.19	0.11	0.11	0.00
Capacity (veh/h)	890	802	775	723
Control Delay (s)	7.9	7.9	7.9	7.6
Approach Delay (s)	7.9	7.9	7.9	7.6
Approach LOS	A	A	A	A

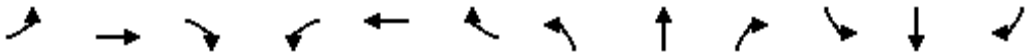
Intersection Summary				
Delay	7.9			
Level of Service	A			
Intersection Capacity Utilization	37.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	43	90	111	63	65	108
Future Volume (vph)	43	90	111	63	65	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	98	121	68	71	117

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	145	189	188
Volume Left (vph)	47	0	71
Volume Right (vph)	98	68	0
Hadj (s)	-0.31	-0.18	0.11
Departure Headway (s)	4.4	4.3	4.6
Degree Utilization, x	0.18	0.22	0.24
Capacity (veh/h)	747	805	753
Control Delay (s)	8.4	8.5	9.0
Approach Delay (s)	8.4	8.5	9.0
Approach LOS	A	A	A

Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	201	18	19	166	42	25	31	37	46	19	12
Future Volume (Veh/h)	8	201	18	19	166	42	25	31	37	46	19	12
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	218	20	21	180	46	27	34	40	50	21	13
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.92						0.92	0.92		0.92	0.92	0.92
vC, conflicting volume	229			249			530	528	247	559	515	210
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	117			249			444	442	247	476	428	96
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			94	92	95	87	95	99
cM capacity (veh/h)	1349			1305			441	452	779	396	461	877

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	247	247	101	84
Volume Left	9	21	27	50
Volume Right	20	46	40	13
cSH	1349	1305	538	450
Volume to Capacity	0.01	0.02	0.19	0.19
Queue Length 95th (ft)	1	1	17	17
Control Delay (s)	0.3	0.8	13.2	14.8
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	13.2	14.8
Approach LOS			B	B

Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	35.5%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Oceanside Blvd
E/W Street Name	Oceanside Boulevard
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	1	1	0	0	0	1	1	0	0	1	0
Lane Assignment			LTR		L		TR		LT		R				LTR	
Volume (V), veh/h	0	40	160	60	0	263	155	235	0	63	618	169	0	242	525	21
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	44	177	67	0	292	172	261	0	70	685	187	0	268	582	23
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	2				1				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		4.1129		5.1929	5.1929		4.2929	4.1129			4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858		3.1858	3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		288		292	433		755	187			873	
Entry Volume veh/h		282		286	425		740	183			856	
Circulating Flow (Vc), pc/h	1142			799			489			534		
Exiting Flow (Vex), pc/h	632			265			990			941		
Capacity (cPCE), pc/h		508		508	508		783	802			778	
Capacity (c), veh/h		498		498	498		768	787			762	
v/c Ratio (X)		0.57		0.57	0.85		0.96	0.23			1.12	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		19.1		19.4	40.5		47.3	7.1			93.4	
Lane LOS		C		C	E		E	A			F	
95% Queue		3.5		3.6	8.8		15.0	0.9			24.7	
Approach Delay, s/veh	19.1			32.0			39.3			93.4		
Approach LOS	C			D			E			F		
Intersection Delay, s/veh / LOS	52.1						F					

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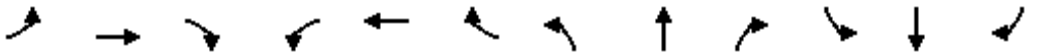
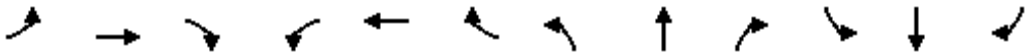


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	513	6	22	570	63	9	10	57	118	8	30
Future Volume (vph)	15	513	6	22	570	63	9	10	57	118	8	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3531		1764	3482			3091			1779	1544
Flt Permitted	0.39	1.00		0.44	1.00			0.90			0.73	1.00
Satd. Flow (perm)	727	3531		817	3482			2802			1359	1544
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	558	7	24	620	68	10	11	62	128	9	33
RTOR Reduction (vph)	0	2	0	0	13	0	0	50	0	0	0	27
Lane Group Flow (vph)	16	563	0	24	675	0	0	33	0	0	137	6
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	13.1	13.1		13.1	13.1			5.3			5.3	5.3
Effective Green, g (s)	13.1	13.1		13.1	13.1			5.3			5.3	5.3
Actuated g/C Ratio	0.47	0.47		0.47	0.47			0.19			0.19	0.19
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	341	1657		383	1634			532			258	293
v/s Ratio Prot		0.16			c0.19							
v/s Ratio Perm	0.02			0.03				0.01			c0.10	0.00
v/c Ratio	0.05	0.34		0.06	0.41			0.06			0.53	0.02
Uniform Delay, d1	4.0	4.7		4.0	4.9			9.3			10.2	9.2
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.1	0.1		0.1	0.2			0.1			2.7	0.0
Delay (s)	4.1	4.8		4.1	5.0			9.3			12.8	9.2
Level of Service	A	A		A	A			A			B	A
Approach Delay (s)		4.8			5.0			9.3			12.1	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	5.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	27.9	Sum of lost time (s)	9.5
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

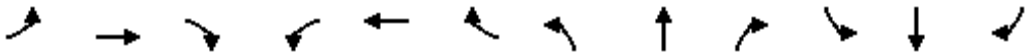
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	10	12	24	10	80	16	653	44	102	680	15
Future Volume (vph)	33	10	12	24	10	80	16	653	44	102	680	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1743			1797	1555	1770	3500		1770	3526	
Flt Permitted		0.79			0.75	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1427			1401	1555	1770	3500		1770	3526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	11	13	26	11	87	17	710	48	111	739	16
RTOR Reduction (vph)	0	11	0	0	0	76	0	6	0	0	2	0
Lane Group Flow (vph)	0	49	0	0	37	11	17	752	0	111	753	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		5.5			5.5	5.5	0.6	18.6		6.4	24.4	
Effective Green, g (s)		5.5			5.5	5.5	0.6	18.6		6.4	24.4	
Actuated g/C Ratio		0.12			0.12	0.12	0.01	0.42		0.14	0.55	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		177			174	193	24	1472		256	1946	
v/s Ratio Prot							0.01	c0.21		c0.06	0.21	
v/s Ratio Perm		c0.03			0.03	0.01						
v/c Ratio		0.27			0.21	0.06	0.71	0.51		0.43	0.39	
Uniform Delay, d1		17.5			17.4	17.1	21.7	9.4		17.2	5.6	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.2	0.0	65.6	0.3		1.2	0.1	
Delay (s)		17.8			17.6	17.1	87.3	9.7		18.4	5.8	
Level of Service		B			B	B	F	A		B	A	
Approach Delay (s)		17.8			17.3			11.4			7.4	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	44.2	Sum of lost time (s)	13.7
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

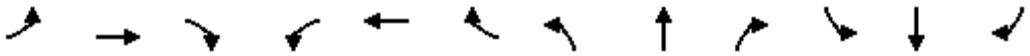
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	135	10	11	82	0	22	0	19	0	0	0
Future Volume (Veh/h)	2	135	10	11	82	0	22	0	19	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	147	11	12	89	0	24	0	21	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	89			158			270	270	152	290	275	89
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			158			270	270	152	290	275	89
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			96	100	98	100	100	100
cM capacity (veh/h)	1506			1422			678	631	894	641	626	969

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	160	101	45	0
Volume Left	2	12	24	0
Volume Right	11	0	21	0
cSH	1506	1422	764	1700
Volume to Capacity	0.00	0.01	0.06	0.00
Queue Length 95th (ft)	0	1	5	0
Control Delay (s)	0.1	1.0	10.0	0.0
Lane LOS	A	A	B	A
Approach Delay (s)	0.1	1.0	10.0	0.0
Approach LOS			B	A

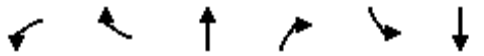
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	21.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	75	16	0	29	0	16	1	5	0	0	0
Future Volume (Veh/h)	0	75	16	0	29	0	16	1	5	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	82	17	0	32	0	17	1	5	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	32			99			122	122	90	128	131	32
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	32			99			122	122	90	128	131	32
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	100	99	100	100	100
cM capacity (veh/h)	1580			1494			852	768	967	840	760	1042

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	99	32	23	0
Volume Left	0	0	17	0
Volume Right	17	0	5	0
cSH	1580	1494	871	1700
Volume to Capacity	0.00	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	2	0
Control Delay (s)	0.0	0.0	9.2	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.2	0.0
Approach LOS			A	A

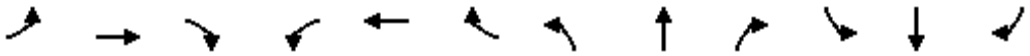
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	14.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	37	154	11	21	184	11
Future Volume (vph)	37	154	11	21	184	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	167	12	23	200	12

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	207	35	212
Volume Left (vph)	40	0	200
Volume Right (vph)	167	23	0
Hadj (s)	-0.41	-0.36	0.22
Departure Headway (s)	4.1	4.2	4.6
Degree Utilization, x	0.23	0.04	0.27
Capacity (veh/h)	830	791	742
Control Delay (s)	8.3	7.4	9.3
Approach Delay (s)	8.3	7.4	9.3
Approach LOS	A	A	A

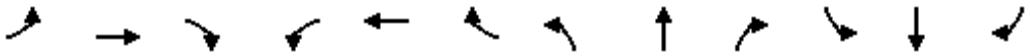
Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	203	61	9	159	10	83	11	12	3	8	15
Future Volume (Veh/h)	6	203	61	9	159	10	83	11	12	3	8	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	221	66	10	173	11	90	12	13	3	9	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	184			287			487	472	254	486	500	178
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	184			287			487	472	254	486	500	178
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			81	98	98	99	98	98
cM capacity (veh/h)	1391			1275			470	484	785	470	467	864

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	294	194	115	28
Volume Left	7	10	90	3
Volume Right	66	11	13	16
cSH	1391	1275	494	634
Volume to Capacity	0.01	0.01	0.23	0.04
Queue Length 95th (ft)	0	1	22	3
Control Delay (s)	0.2	0.5	14.5	10.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.5	14.5	10.9
Approach LOS			B	B

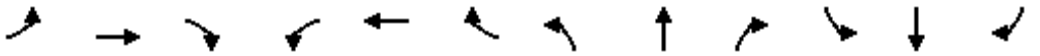
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	35.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	208	5	15	173	26	3	7	14	12	3	3
Future Volume (Veh/h)	3	208	5	15	173	26	3	7	14	12	3	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	226	5	16	188	28	3	8	15	13	3	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	216			231			473	482	228	488	471	202
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	216			231			473	482	228	488	471	202
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	98	98	97	99	100
cM capacity (veh/h)	1354			1337			492	477	811	470	484	839

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	234	232	26	19
Volume Left	3	16	3	13
Volume Right	5	28	15	3
cSH	1354	1337	628	508
Volume to Capacity	0.00	0.01	0.04	0.04
Queue Length 95th (ft)	0	1	3	3
Control Delay (s)	0.1	0.6	11.0	12.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.6	11.0	12.4
Approach LOS			B	B

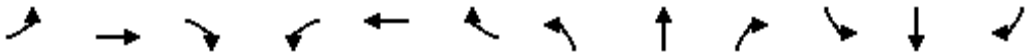
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	30.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	118	106	51	68	23	117	696	74	92	552	41
Future Volume (vph)	53	118	106	51	68	23	117	696	74	92	552	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.95			0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750			1790		1770	3488		1770	3502	
Flt Permitted		0.91			0.78		0.95	1.00		0.34	1.00	
Satd. Flow (perm)		1605			1422		1770	3488		627	3502	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	128	115	55	74	25	127	757	80	100	600	45
RTOR Reduction (vph)	0	28	0	0	9	0	0	12	0	0	7	0
Lane Group Flow (vph)	0	273	0	0	145	0	127	825	0	100	638	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		14.4			14.0		7.0	28.2		17.0	17.0	
Effective Green, g (s)		14.4			14.0		7.0	28.2		17.0	17.0	
Actuated g/C Ratio		0.28			0.27		0.13	0.54		0.33	0.33	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		442			381		237	1884		204	1140	
v/s Ratio Prot							0.07	c0.24			c0.18	
v/s Ratio Perm		c0.17			0.10					0.16		
v/c Ratio		0.62			0.38		0.54	0.44		0.49	0.56	
Uniform Delay, d1		16.5			15.6		21.1	7.2		14.1	14.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.6			0.8		1.2	0.2		1.9	0.6	
Delay (s)		19.1			16.3		22.3	7.4		16.0	15.1	
Level of Service		B			B		C	A		B	B	
Approach Delay (s)		19.1			16.3			9.3			15.2	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	52.2	Sum of lost time (s)	14.2
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

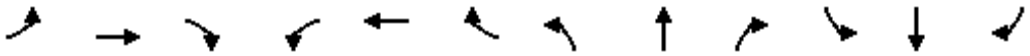
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	260	13	13	117	5	15	18	6	8	7	9
Future Volume (Veh/h)	9	260	13	13	117	5	15	18	6	8	7	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	283	14	14	127	5	16	20	7	9	8	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked				0.99			0.99	0.99	0.99	0.99	0.99	
vC, conflicting volume	132			297			482	470	290	484	474	130
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	132			289			475	463	282	478	468	130
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	96	99	98	98	99
cM capacity (veh/h)	1453			1264			479	484	752	468	481	920

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	307	146	43	27
Volume Left	10	14	16	9
Volume Right	14	5	7	10
cSH	1453	1264	511	578
Volume to Capacity	0.01	0.01	0.08	0.05
Queue Length 95th (ft)	1	1	7	4
Control Delay (s)	0.3	0.8	12.7	11.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	12.7	11.5
Approach LOS			B	B

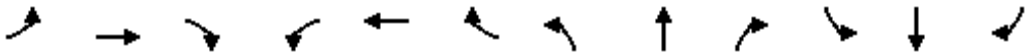
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	26.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	251	9	11	119	3	12	23	11	4	10	6
Future Volume (vph)	9	251	9	11	119	3	12	23	11	4	10	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	273	10	12	129	3	13	25	12	4	11	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	293	144	50	22
Volume Left (vph)	10	12	13	4
Volume Right (vph)	10	3	12	7
Hadj (s)	0.02	0.04	-0.06	-0.12
Departure Headway (s)	4.3	4.4	4.8	4.8
Degree Utilization, x	0.35	0.18	0.07	0.03
Capacity (veh/h)	828	781	677	670
Control Delay (s)	9.5	8.4	8.2	8.0
Approach Delay (s)	9.5	8.4	8.2	8.0
Approach LOS	A	A	A	A

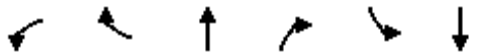
Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	26.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	267	16	68	115	33	16	80	154	63	17	4
Future Volume (vph)	17	267	16	68	115	33	16	80	154	63	17	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	290	17	74	125	36	17	87	167	68	18	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	325	235	271	90
Volume Left (vph)	18	74	17	68
Volume Right (vph)	17	36	167	4
Hadj (s)	0.01	0.01	-0.32	0.16
Departure Headway (s)	5.3	5.5	5.3	6.1
Degree Utilization, x	0.48	0.36	0.40	0.15
Capacity (veh/h)	634	610	622	509
Control Delay (s)	13.2	11.5	11.7	10.2
Approach Delay (s)	13.2	11.5	11.7	10.2
Approach LOS	B	B	B	B

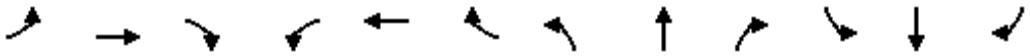
Intersection Summary				
Delay	12.0			
Level of Service	B			
Intersection Capacity Utilization	60.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	5	57	58	4	41	22
Future Volume (vph)	5	57	58	4	41	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	62	63	4	45	24

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	67	67	69
Volume Left (vph)	5	0	45
Volume Right (vph)	62	4	0
Hadj (s)	-0.51	0.00	0.16
Departure Headway (s)	3.7	4.1	4.3
Degree Utilization, x	0.07	0.08	0.08
Capacity (veh/h)	938	851	826
Control Delay (s)	7.0	7.4	7.6
Approach Delay (s)	7.0	7.4	7.6
Approach LOS	A	A	A

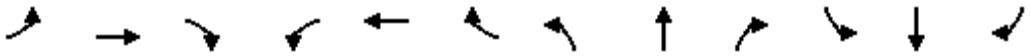
Intersection Summary			
Delay	7.3		
Level of Service	A		
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	103	33	203	82	350	37	569	269	293	478	18
Future Volume (vph)	15	103	33	203	82	350	37	569	269	293	478	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1553		1799	1583	1770	3331		1770	3514	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1553		1799	1583	1770	3331		1770	3514	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	112	36	221	89	380	40	618	292	318	520	20
RTOR Reduction (vph)	0	0	33	0	0	313	0	57	0	0	2	0
Lane Group Flow (vph)	16	112	3	0	310	67	40	853	0	318	538	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	Over	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	6.6	6.6	6.6		17.3	14.0	3.2	22.4		14.0	33.2	
Effective Green, g (s)	6.6	6.6	6.6		17.3	14.0	3.2	22.4		14.0	33.2	
Actuated g/C Ratio	0.08	0.08	0.08		0.22	0.18	0.04	0.28		0.18	0.42	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	147	154	129		391	279	71	939		312	1469	
v/s Ratio Prot	0.01	c0.06			c0.17	0.04	0.02	c0.26		c0.18	0.15	
v/s Ratio Perm			0.00									
v/c Ratio	0.11	0.73	0.02		0.79	0.24	0.56	0.91		1.02	0.37	
Uniform Delay, d1	33.7	35.5	33.4		29.4	28.1	37.4	27.5		32.7	15.9	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	13.5	0.0		10.5	0.2	6.0	12.3		55.9	0.2	
Delay (s)	33.8	49.0	33.5		39.9	28.3	43.4	39.8		88.6	16.0	
Level of Service	C	D	C		D	C	D	D		F	B	
Approach Delay (s)		44.1			33.5			39.9			42.9	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	79.4	Sum of lost time (s)	19.1
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

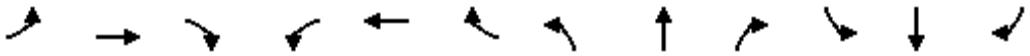
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	618	6	8	594	28	4	0	8	13	3	30
Future Volume (Veh/h)	5	618	6	8	594	28	4	0	8	13	3	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	672	7	9	646	30	4	0	9	14	3	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	676			679			1399	1380	676	1374	1368	661
vC1, stage 1 conf vol							686	686		679	679	
vC2, stage 2 conf vol							714	694		694	689	
vCu, unblocked vol	676			637			1394	1373	634	1367	1361	661
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	100	98	96	99	93
cM capacity (veh/h)	915			901			297	330	456	314	331	462

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	684	685	13	50
Volume Left	5	9	4	14
Volume Right	7	30	9	33
cSH	915	901	392	400
Volume to Capacity	0.01	0.01	0.03	0.13
Queue Length 95th (ft)	0	1	3	11
Control Delay (s)	0.1	0.3	14.5	15.3
Lane LOS	A	A	B	C
Approach Delay (s)	0.1	0.3	14.5	15.3
Approach LOS			B	C

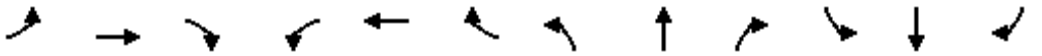
Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	48.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	730	5	12	718	33	1	1	19	13	1	8
Future Volume (Veh/h)	5	730	5	12	718	33	1	1	19	13	1	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	793	5	13	780	36	1	1	21	14	1	9
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.99			0.99	0.99	0.99	0.99	0.99	
vC, conflicting volume	816			799			1641	1648	796	1651	1633	799
vC1, stage 1 conf vol							806	806		824	824	
vC2, stage 2 conf vol							834	842		827	809	
vCu, unblocked vol	816			793			1642	1650	790	1652	1634	799
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			100	100	95	94	100	98
cM capacity (veh/h)	812			820			256	278	386	247	278	385

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	803	829	23	24
Volume Left	5	13	1	14
Volume Right	5	36	21	9
cSH	812	820	372	287
Volume to Capacity	0.01	0.02	0.06	0.08
Queue Length 95th (ft)	0	1	5	7
Control Delay (s)	0.2	0.4	15.3	18.7
Lane LOS	A	A	C	C
Approach Delay (s)	0.2	0.4	15.3	18.7
Approach LOS			C	C

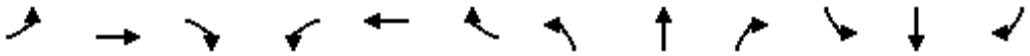
Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	722	0	9	743	205	0	0	5	3	0	11
Future Volume (Veh/h)	8	722	0	9	743	205	0	0	5	3	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	785	0	10	808	223	0	0	5	3	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1031			785			1643	1854	785	1748	1742	920
vC1, stage 1 conf vol							803	803		940	940	
vC2, stage 2 conf vol							840	1051		808	803	
vCu, unblocked vol	1031			785			1643	1854	785	1748	1742	920
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	99	99	100	96
cM capacity (veh/h)	674			834			253	237	393	237	260	329

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	794	10	1031	5	15
Volume Left	9	10	0	0	3
Volume Right	0	0	223	5	12
cSH	674	834	1700	393	305
Volume to Capacity	0.01	0.01	0.61	0.01	0.05
Queue Length 95th (ft)	1	1	0	1	4
Control Delay (s)	0.4	9.4	0.0	14.3	17.4
Lane LOS	A	A		B	C
Approach Delay (s)	0.4	0.1		14.3	17.4
Approach LOS				B	C

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	41	5	0	13	43	721	4	18	578	4
Future Volume (Veh/h)	0	0	41	5	0	13	43	721	4	18	578	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	45	5	0	14	47	784	4	20	628	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1170	1552	630	1593	1552	394	632			788		
vC1, stage 1 conf vol	670	670		880	880							
vC2, stage 2 conf vol	500	882		713	672							
vCu, unblocked vol	1170	1552	630	1593	1552	394	632			788		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	89	98	100	98	95			98		
cM capacity (veh/h)	324	273	424	210	273	605	947			827		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	45	19	47	523	265	20	632
Volume Left	0	5	47	0	0	20	0
Volume Right	45	14	0	0	4	0	4
cSH	424	405	947	1700	1700	827	1700
Volume to Capacity	0.11	0.05	0.05	0.31	0.16	0.02	0.37
Queue Length 95th (ft)	9	4	4	0	0	2	0
Control Delay (s)	14.5	14.3	9.0	0.0	0.0	9.5	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	14.5	14.3	0.5			0.3	
Approach LOS	B	B					

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	122	53	50	0	33	7	16	0	16	690	28	0	12	690	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	135	59	55	0	37	8	18	0	18	765	31	0	13	765	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		249			63			814			811	
Entry Volume veh/h		244			62			798			795	
Circulating Flow (Vc), pc/h	815			918			207			63		
Exiting Flow (Vex), pc/h	103			59			918			857		
Capacity (cPCE), pc/h		500			451			919			1061	
Capacity (c), veh/h		490			442			901			1040	
v/c Ratio (X)		0.50			0.14			0.89			0.76	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		16.9			10.2			30.2			17.5	
Lane LOS		C			B			D			C	
95% Queue		2.7			0.5			12.0			7.8	
Approach Delay, s/veh	16.9			10.2			30.2			17.5		
Approach LOS	C			B			D			C		
Intersection Delay, s/veh / LOS	22.5						C					

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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	582	209	627	667	0	0
Future Volume (veh/h)	582	209	627	667	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863		
Adj Flow Rate, veh/h	633	227	682	725		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1593	712	1205	3185		
Arrive On Green	0.45	0.45	0.35	0.90		
Sat Flow, veh/h	3632	1583	3442	3632		
Grp Volume(v), veh/h	633	227	682	725		
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770		
Q Serve(g_s), s	4.8	3.7	6.4	1.0		
Cycle Q Clear(g_c), s	4.8	3.7	6.4	1.0		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1593	712	1205	3185		
V/C Ratio(X)	0.40	0.32	0.57	0.23		
Avail Cap(c_a), veh/h	1593	712	1205	3185		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	7.4	7.1	10.5	0.3		
Incr Delay (d2), s/veh	0.7	1.2	1.9	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.5	1.8	3.4	0.5		
LnGrp Delay(d),s/veh	8.1	8.2	12.5	0.4		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	860			1407		
Approach Delay, s/veh	8.1			6.3		
Approach LOS	A			A		

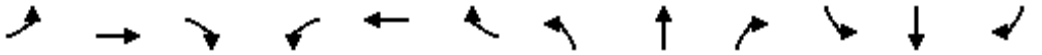
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			18.0	22.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			14.0	18.0				36.0
Max Q Clear Time (g_c+I1), s			8.4	6.8				3.0
Green Ext Time (p_c), s			1.4	3.9				5.8

Intersection Summary	
HCM 2010 Ctrl Delay	7.0
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1267	114	370	964	183	0
Future Volume (veh/h)	1267	114	370	964	183	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	1377	124	402	1048	199	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1416	633	459	2124	473	422
Arrive On Green	0.40	0.40	0.13	0.60	0.27	0.00
Sat Flow, veh/h	3632	1583	3442	3632	1774	1583
Grp Volume(v), veh/h	1377	124	402	1048	199	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770	1774	1583
Q Serve(g_s), s	22.9	3.1	6.9	10.1	5.6	0.0
Cycle Q Clear(g_c), s	22.9	3.1	6.9	10.1	5.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1416	633	459	2124	473	422
V/C Ratio(X)	0.97	0.20	0.88	0.49	0.42	0.00
Avail Cap(c_a), veh/h	1416	633	459	2124	473	422
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.7	11.7	25.5	6.8	18.2	0.0
Incr Delay (d2), s/veh	18.2	0.7	20.3	0.8	2.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.7	1.4	4.5	5.0	3.1	0.0
LnGrp Delay(d),s/veh	35.9	12.4	45.8	7.6	20.9	0.0
LnGrp LOS	D	B	D	A	C	
Approach Vol, veh/h	1501			1450	199	
Approach Delay, s/veh	34.0			18.2	20.9	
Approach LOS	C			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	12.0	28.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	8.0	24.0				36.0
Max Q Clear Time (g_c+I1), s		7.6	8.9	24.9				12.1
Green Ext Time (p_c), s		0.3	0.0	0.0				8.4

Intersection Summary	
HCM 2010 Ctrl Delay	25.9
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1094	10	163	1017	450	8	0	62	323	18	125
Future Volume (veh/h)	0	1094	10	163	1017	450	8	0	62	323	18	125
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	1863	1863	0	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	1189	11	177	1105	0	9	0	67	365	0	136
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1670	15	250	2343	1048	0	0	0	800	0	357
Arrive On Green	0.00	0.46	0.46	0.14	0.66	0.00	0.00	0.00	0.00	0.23	0.00	0.23
Sat Flow, veh/h	0	3686	33	1774	3539	1583		0		3548	0	1583
Grp Volume(v), veh/h	0	586	614	177	1105	0		0.0		365	0	136
Grp Sat Flow(s),veh/h/ln	0	1770	1857	1774	1770	1583				1774	0	1583
Q Serve(g_s), s	0.0	18.8	18.8	6.8	10.9	0.0				6.3	0.0	5.2
Cycle Q Clear(g_c), s	0.0	18.8	18.8	6.8	10.9	0.0				6.3	0.0	5.2
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	822	863	250	2343	1048				800	0	357
V/C Ratio(X)	0.00	0.71	0.71	0.71	0.47	0.00				0.46	0.00	0.38
Avail Cap(c_a), veh/h	0	822	863	250	2343	1048				800	0	357
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	15.2	15.2	29.1	5.9	0.0				23.7	0.0	23.3
Incr Delay (d2), s/veh	0.0	5.2	5.0	15.6	0.7	0.0				1.9	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	10.3	10.7	4.4	5.4	0.0				3.3	0.0	2.6
LnGrp Delay(d),s/veh	0.0	20.4	20.2	44.7	6.6	0.0				25.6	0.0	26.4
LnGrp LOS		C	C	D	A					C		C
Approach Vol, veh/h		1200			1282						501	
Approach Delay, s/veh		20.3			11.9						25.8	
Approach LOS		C			B						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			14.0	37.0		20.0		51.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			10.0	33.0		16.0		47.0
Max Q Clear Time (g_c+I1), s			8.8	20.8		8.3		12.9
Green Ext Time (p_c), s			0.1	6.3		1.2		10.1

Intersection Summary	
HCM 2010 Ctrl Delay	17.6
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	252	584	23	69	857	426	21	7	37	417	19	103
Future Volume (veh/h)	252	584	23	69	857	426	21	7	37	417	19	103
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	274	635	25	75	932	463	23	8	40	293	245	112
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	296	1157	46	177	944	721	267	93	317	335	229	105
Arrive On Green	0.17	0.33	0.33	0.10	0.27	0.27	0.20	0.20	0.20	0.19	0.19	0.19
Sat Flow, veh/h	1774	3472	137	1774	3539	1583	1333	464	1583	1774	1211	554
Grp Volume(v), veh/h	274	323	337	75	932	463	31	0	40	293	0	357
Grp Sat Flow(s),veh/h/ln	1774	1770	1839	1774	1770	1583	1796	0	1583	1774	0	1765
Q Serve(g_s), s	13.7	13.4	13.4	3.6	23.6	20.3	1.3	0.0	1.9	14.4	0.0	17.0
Cycle Q Clear(g_c), s	13.7	13.4	13.4	3.6	23.6	20.3	1.3	0.0	1.9	14.4	0.0	17.0
Prop In Lane	1.00		0.07	1.00		1.00	0.74		1.00	1.00		0.31
Lane Grp Cap(c), veh/h	296	590	613	177	944	721	359	0	317	335	0	333
V/C Ratio(X)	0.93	0.55	0.55	0.42	0.99	0.64	0.09	0.00	0.13	0.87	0.00	1.07
Avail Cap(c_a), veh/h	296	590	613	177	944	721	359	0	317	335	0	333
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.0	24.5	24.5	38.1	32.9	18.9	29.3	0.0	29.5	35.5	0.0	36.5
Incr Delay (d2), s/veh	36.5	3.6	3.5	7.2	26.4	4.4	0.5	0.0	0.8	25.7	0.0	69.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.7	7.2	7.4	2.1	15.0	12.3	0.7	0.0	0.9	9.5	0.0	14.7
LnGrp Delay(d),s/veh	73.5	28.1	28.0	45.3	59.3	23.2	29.8	0.0	30.4	61.2	0.0	105.9
LnGrp LOS	E	C	C	D	E	C	C		C	E		F
Approach Vol, veh/h		934			1470			71			650	
Approach Delay, s/veh		41.4			47.2			30.1			85.7	
Approach LOS		D			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.0	13.0	34.0		21.0	19.0	28.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	9.0	30.0		17.0	15.0	24.0
Max Q Clear Time (g_c+I1), s		3.9	5.6	15.4		19.0	15.7	25.6
Green Ext Time (p_c), s		0.2	0.0	3.5		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	53.1
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	834	139	45	735	259	177	56	72	612	136	449
Future Volume (veh/h)	70	834	139	45	735	259	177	56	72	612	136	449
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	76	907	151	49	799	282	126	153	78	771	0	488
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	118	945	157	79	1022	457	335	352	299	986	0	440
Arrive On Green	0.07	0.31	0.31	0.04	0.29	0.29	0.19	0.19	0.19	0.28	0.00	0.28
Sat Flow, veh/h	1774	3038	506	1774	3539	1583	1774	1863	1583	3548	0	1583
Grp Volume(v), veh/h	76	528	530	49	799	282	126	153	78	771	0	488
Grp Sat Flow(s),veh/h/ln	1774	1770	1774	1774	1770	1583	1774	1863	1583	1774	0	1583
Q Serve(g_s), s	3.8	26.4	26.4	2.4	18.7	13.9	5.6	6.5	3.8	18.0	0.0	25.0
Cycle Q Clear(g_c), s	3.8	26.4	26.4	2.4	18.7	13.9	5.6	6.5	3.8	18.0	0.0	25.0
Prop In Lane	1.00		0.29	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	118	551	552	79	1022	457	335	352	299	986	0	440
V/C Ratio(X)	0.64	0.96	0.96	0.62	0.78	0.62	0.38	0.43	0.26	0.78	0.00	1.11
Avail Cap(c_a), veh/h	118	551	552	79	1022	457	335	352	299	986	0	440
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.0	30.4	30.4	42.3	29.4	27.7	31.9	32.3	31.1	30.0	0.0	32.5
Incr Delay (d2), s/veh	23.8	29.6	29.6	31.6	5.9	6.1	3.2	3.9	2.1	6.2	0.0	76.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	17.3	17.3	1.9	9.9	6.8	3.0	3.7	1.8	9.6	0.0	20.2
LnGrp Delay(d),s/veh	64.8	60.0	60.0	73.9	35.3	33.8	35.1	36.1	33.2	36.2	0.0	108.6
LnGrp LOS	E	E	E	E	D	C	D	D	C	D		F
Approach Vol, veh/h		1134			1130			357			1259	
Approach Delay, s/veh		60.4			36.6			35.1			64.3	
Approach LOS		E			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	8.0	32.0		29.0	10.0	30.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	28.0		25.0	6.0	26.0
Max Q Clear Time (g_c+I1), s		8.5	4.4	28.4		27.0	5.8	20.7
Green Ext Time (p_c), s		1.0	0.0	0.0		0.0	0.0	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	52.4
HCM 2010 LOS	D

Notes

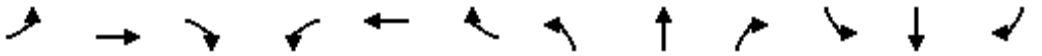
Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	85	12	27	93	39	7	86	32	0	0	0
Future Vol, veh/h	40	85	12	27	93	39	7	86	32	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	92	13	29	101	42	8	93	35	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.5	8.4	8.5
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	6%	29%	17%
Vol Thru, %	69%	62%	58%
Vol Right, %	26%	9%	25%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	125	137	159
LT Vol	7	40	27
Through Vol	86	85	93
RT Vol	32	12	39
Lane Flow Rate	136	149	173
Geometry Grp	1	1	1
Degree of Util (X)	0.17	0.184	0.207
Departure Headway (Hd)	4.505	4.444	4.304
Convergence, Y/N	Yes	Yes	Yes
Cap	798	809	835
Service Time	2.529	2.463	2.322
HCM Lane V/C Ratio	0.17	0.184	0.207
HCM Control Delay	8.5	8.5	8.4
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.6	0.7	0.8

Appendix G – Analysis Output Sheets (Existing with Project Alternative 2)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	78	51	71	290	486	142	14	107	71	18	66
Future Volume (vph)	85	78	51	71	290	486	142	14	107	71	18	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3158	1441		1782	1583		1792	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3158	1441		1782	1583		1792	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	85	55	77	315	528	154	15	116	77	20	72
RTOR Reduction (vph)	0	0	47	0	181	218	0	0	81	0	0	56
Lane Group Flow (vph)	92	85	8	77	398	46	0	169	35	0	97	16
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.2	11.0	11.0	6.6	14.0	14.0		24.6	24.6		17.6	17.6
Effective Green, g (s)	7.2	11.0	11.0	6.6	14.0	14.0		24.6	24.6		17.6	17.6
Actuated g/C Ratio	0.09	0.14	0.14	0.08	0.17	0.17		0.31	0.31		0.22	0.22
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	158	254	216	144	548	250		543	483		391	345
v/s Ratio Prot	c0.05	0.05		0.04	c0.13			c0.09			c0.05	
v/s Ratio Perm			0.00			0.03			0.02			0.01
v/c Ratio	0.58	0.33	0.03	0.53	0.73	0.18		0.31	0.07		0.25	0.05
Uniform Delay, d1	35.3	31.5	30.2	35.5	31.5	28.4		21.5	19.9		26.0	24.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	5.4	0.3	0.0	3.8	4.1	0.1		1.5	0.3		1.5	0.2
Delay (s)	40.6	31.8	30.2	39.3	35.5	28.6		23.0	20.2		27.5	25.1
Level of Service	D	C	C	D	D	C		C	C		C	C
Approach Delay (s)		34.9			33.8			21.9			26.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	20.8
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	07/22/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	2	0	325	0	239	0	1	113	369	0	76	105	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	2	0	360	0	260	0	1	125	409	0	84	116	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		2		0	360	260		126	409	84	116	
Entry Volume veh/h		2		0	353	260		124	401	82	114	
Circulating Flow (Vc), pc/h	560			126			84			361		
Exiting Flow (Vex), pc/h	84			1			125			478		
Capacity (cPCE), pc/h		645		1028	1035			1065		862	878	
Capacity (c), veh/h		633		1008	1014			1045		845	860	
v/c Ratio (X)		0.00		0.00	0.35			0.12		0.10	0.13	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.7		3.6	7.2	0.0		4.5	0.0	5.2	5.5	
Lane LOS		A		A	A	A		A	A	A	A	
95% Queue		0.0		0.0	1.6			0.4		0.3	0.5	
Approach Delay, s/veh	5.7			4.1			1.1			5.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	3.1						A					

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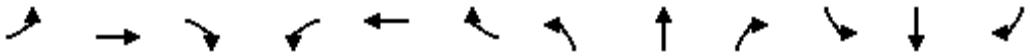
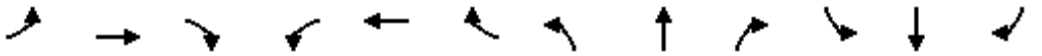


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	4	39	9	29	50	53	28	43	42	79	59	12
Future Volume (vph)	4	39	9	29	50	53	28	43	42	79	59	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	42	10	32	54	58	30	47	46	86	64	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	56	144	123	163
Volume Left (vph)	4	32	30	86
Volume Right (vph)	10	58	46	13
Hadj (s)	-0.06	-0.16	-0.14	0.09
Departure Headway (s)	4.7	4.5	4.4	4.6
Degree Utilization, x	0.07	0.18	0.15	0.21
Capacity (veh/h)	704	748	767	738
Control Delay (s)	8.1	8.5	8.2	8.8
Approach Delay (s)	8.1	8.5	8.2	8.8
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	35.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	11	31	6	21	43	29	218	13	17	299	64
Future Volume (vph)	112	11	31	6	21	43	29	218	13	17	299	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	2.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782	1583		1702		1770	1847		1770	1863	1583
Flt Permitted		0.82	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1518	1583		1679		1770	1847		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	122	12	34	7	23	47	32	237	14	18	325	70
RTOR Reduction (vph)	0	0	26	0	36	0	0	3	0	0	0	30
Lane Group Flow (vph)	0	134	8	0	41	0	32	248	0	18	325	40
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		11.0	11.0		11.0		3.2	12.9		11.7	26.2	26.2
Effective Green, g (s)		11.0	11.0		11.0		3.2	12.9		11.7	26.2	26.2
Actuated g/C Ratio		0.24	0.24		0.24		0.07	0.28		0.25	0.56	0.56
Clearance Time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	2.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		3.0	7.0	7.0
Lane Grp Cap (vph)		359	375		398		122	513		446	1051	893
v/s Ratio Prot							c0.02	c0.13		0.01	c0.17	
v/s Ratio Perm		c0.09	0.01		0.02							0.02
v/c Ratio		0.37	0.02		0.10		0.26	0.48		0.04	0.31	0.04
Uniform Delay, d1		14.8	13.6		13.8		20.5	14.0		13.1	5.3	4.5
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		2.3	0.1		0.4		1.2	0.7		0.0	0.6	0.1
Delay (s)		17.1	13.7		14.2		21.6	14.7		13.1	5.9	4.6
Level of Service		B	B		B		C	B		B	A	A
Approach Delay (s)		16.4			14.2			15.5			6.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	46.4	Sum of lost time (s)	10.8
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	07/22/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	9	7	6	0	18	10	18	0	5	210	22	0	52	250	9
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	10	8	7	0	20	11	20	0	6	233	24	0	58	277	10
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		25			51			263			345	
Entry Volume veh/h		25			50			258			338	
Circulating Flow (Vc), pc/h		355			249			76			37	
Exiting Flow (Vex), pc/h		90			27			263			304	
Capacity (cPCE), pc/h		792			881			1047			1089	
Capacity (c), veh/h		777			864			1027			1068	
v/c Ratio (X)		0.03			0.06			0.25			0.32	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.9			4.7			5.9			6.5	
Lane LOS		A			A			A			A	
95% Queue		0.1			0.2			1.0			1.4	
Approach Delay, s/veh	4.9			4.7			5.9			6.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.1						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/11/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	6	9	9	0	10	14	15	0	7	217	11	0	11	236	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	7	10	10	0	11	16	17	0	8	241	12	0	12	262	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		27			44			261			294	
Entry Volume veh/h		26			43			256			288	
Circulating Flow (Vc), pc/h	285			256			29			35		
Exiting Flow (Vex), pc/h	34			44			265			283		
Capacity (cPCE), pc/h		850			875			1098			1091	
Capacity (c), veh/h		833			858			1076			1070	
v/c Ratio (X)		0.03			0.05			0.24			0.27	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.6			4.7			5.6			5.9	
Lane LOS		A			A			A			A	
95% Queue		0.1			0.2			0.9			1.1	
Approach Delay, s/veh	4.6			4.7			5.6			5.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	5.6						A					

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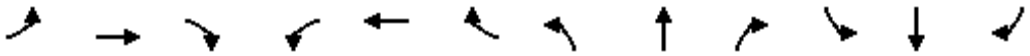
HCM Unsignalized Intersection Capacity Analysis
7: Horne St & Pier View Way

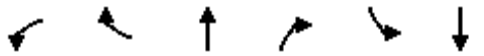
11/17/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	5	19	17	9	5	88	137	6	7	94	6
Future Volume (vph)	2	5	19	17	9	5	88	137	6	7	94	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	5	21	18	10	5	96	149	7	8	102	7

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	7	21	33	171	82	59	58
Volume Left (vph)	2	0	18	96	0	8	0
Volume Right (vph)	0	21	5	0	7	0	7
Hadj (s)	0.18	-0.67	0.05	0.32	-0.03	0.10	-0.05
Departure Headway (s)	5.6	4.7	5.4	5.1	4.7	5.0	4.8
Degree Utilization, x	0.01	0.03	0.05	0.24	0.11	0.08	0.08
Capacity (veh/h)	600	705	619	695	743	701	726
Control Delay (s)	7.4	6.7	8.7	8.5	7.1	7.2	7.0
Approach Delay (s)	6.9		8.7	8.0		7.1	
Approach LOS	A		A	A		A	

Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	26.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	80	46	74	56	27	65
Future Volume (vph)	80	46	74	56	27	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	50	80	61	29	71

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	87	50	141	100
Volume Left (vph)	87	0	0	29
Volume Right (vph)	0	50	61	0
Hadj (s)	0.53	-0.67	-0.23	0.09
Departure Headway (s)	5.6	4.4	4.1	4.5
Degree Utilization, x	0.13	0.06	0.16	0.12
Capacity (veh/h)	612	779	835	763
Control Delay (s)	8.2	6.5	7.9	8.1
Approach Delay (s)	7.6		7.9	8.1
Approach LOS	A		A	A

Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Year 2013 No Project

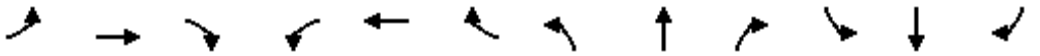
Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #9 Cleveland Street and Mission Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.093
Loss Time (sec):	0	Average Delay (sec/veh):	8.1
Optimal Cycle:	0	Level Of Service:	A

Street Name:	Cleveland Street						Mission Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	0	0 1	0	0 1!	0	0	1 0	1 1	0	1 0	1 1	0
Volume Module:													
Base Vol:	10	10	14	10	13	25	11	91	7	39	111	23
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	10	10	14	10	13	25	11	91	7	39	111	23
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	10	10	14	10	13	25	11	91	7	39	111	23
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	10	10	14	10	13	25	11	91	7	39	111	23
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	10	10	14	10	13	25	11	91	7	39	111	23
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.50	0.50	1.00	0.21	0.27	0.52	1.00	1.86	0.14	1.00	1.66	0.34
Final Sat.:	315	315	755	145	189	363	628	1290	100	646	1199	256
Capacity Analysis Module:												
Vol/Sat:	0.03	0.03	0.02	0.07	0.07	0.07	0.02	0.07	0.07	0.06	0.09	0.09
Crit Moves:	****			****			****			****		
Delay/Veh:	8.3	8.3	7.3	8.3	8.3	8.3	8.4	8.1	8.0	8.5	8.0	7.9
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	8.3	8.3	7.3	8.3	8.3	8.3	8.4	8.1	8.0	8.5	8.0	7.9
LOS by Move:	A	A	A	A	A	A	A	A	A	A	A	A
ApproachDel:	7.9			8.3			8.1			8.1		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	7.9			8.3			8.1			8.1		
LOS by Appr:	A			A			A			A		
AllWayAvgQ:	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1

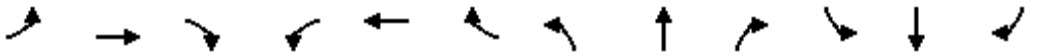
Note: Queue reported is the number of cars per lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	23	124	189	64	14	172	0	0	194	15
Future Volume (vph)	11	0	23	124	189	64	14	172	0	0	194	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	0.95		1.00	1.00			0.95	0.95
Frpb, ped/bikes	1.00		0.96	1.00	0.99		1.00	1.00			1.00	0.97
Flpb, ped/bikes	0.99		1.00	0.98	1.00		1.00	1.00			1.00	1.00
Frt	1.00		0.85	1.00	0.96		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1753		1527	1743	3375		1770	1863			1767	1464
Flt Permitted	0.58		1.00	0.95	1.00		0.60	1.00			1.00	1.00
Satd. Flow (perm)	1075		1527	1743	3375		1124	1863			1767	1464
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	0	25	135	205	70	15	187	0	0	211	16
RTOR Reduction (vph)	0	0	11	0	32	0	0	0	0	0	1	10
Lane Group Flow (vph)	12	0	14	135	243	0	15	187	0	0	212	4
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type	Perm		Perm	Perm	NA		Perm	NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases	4		4	8			2					6
Actuated Green, G (s)	27.3		27.3	27.3	27.3		12.7	12.7			12.7	12.7
Effective Green, g (s)	27.3		27.3	27.3	27.3		12.7	12.7			12.7	12.7
Actuated g/C Ratio	0.55		0.55	0.55	0.55		0.25	0.25			0.25	0.25
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0		4.0	4.0			4.0	4.0
Lane Grp Cap (vph)	586		833	951	1842		285	473			448	371
v/s Ratio Prot					0.07			0.10			c0.12	
v/s Ratio Perm	0.01		0.01	c0.08			0.01					0.00
v/c Ratio	0.02		0.02	0.14	0.13		0.05	0.40			0.47	0.01
Uniform Delay, d1	5.2		5.2	5.6	5.6		14.1	15.5			15.8	13.9
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			0.26	0.62
Incremental Delay, d2	0.1		0.0	0.3	0.1		0.1	0.7			1.0	0.0
Delay (s)	5.3		5.2	5.9	5.7		14.2	16.2			5.1	8.6
Level of Service	A		A	A	A		B	B			A	A
Approach Delay (s)		5.2			5.8			16.1			5.4	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	132	2	50	462	194	3	14	202	132	10	7
Future Volume (vph)	5	132	2	50	462	194	3	14	202	132	10	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.86		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.96	
Satd. Flow (prot)	1770	3532		1770	3539	1583	1770	1601		1681	1679	
Flt Permitted	0.47	1.00		0.66	1.00	1.00	0.70	1.00		0.61	0.63	
Satd. Flow (perm)	871	3532		1229	3539	1583	1308	1601		1084	1103	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	143	2	54	502	211	3	15	220	143	11	8
RTOR Reduction (vph)	0	1	0	0	0	123	0	164	0	0	6	0
Lane Group Flow (vph)	5	144	0	54	502	88	3	71	0	82	74	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	12.6	12.6		12.2	12.2	12.2	7.5	7.5		7.5	7.5	
Effective Green, g (s)	12.6	12.6		12.2	12.2	12.2	7.5	7.5		7.5	7.5	
Actuated g/C Ratio	0.43	0.43		0.42	0.42	0.42	0.26	0.26		0.26	0.26	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	374	1518		511	1473	659	334	409		277	282	
v/s Ratio Prot		0.04			c0.14			0.04				
v/s Ratio Perm	0.01			0.04		0.06	0.00			c0.08	0.07	
v/c Ratio	0.01	0.09		0.11	0.34	0.13	0.01	0.17		0.30	0.26	
Uniform Delay, d1	4.8	5.0		5.2	5.8	5.3	8.1	8.5		8.8	8.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.0		0.1	0.2	0.1	0.0	0.3		0.8	0.7	
Delay (s)	4.8	5.0		5.3	6.0	5.4	8.1	8.8		9.6	9.4	
Level of Service	A	A		A	A	A	A	A		A	A	
Approach Delay (s)		5.0			5.8			8.8			9.5	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	29.3	Sum of lost time (s)	9.6
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		

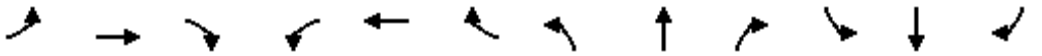
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	35	12	44	60	11	17
Future Volume (Veh/h)	35	12	44	60	11	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	13	48	65	12	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			51		206	44
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			51		206	44
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		98	98
cM capacity (veh/h)			1555		759	1025

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	51	113	30
Volume Left	0	48	12
Volume Right	13	0	18
cSH	1700	1555	899
Volume to Capacity	0.03	0.03	0.03
Queue Length 95th (ft)	0	2	3
Control Delay (s)	0.0	3.3	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	3.3	9.1
Approach LOS			A

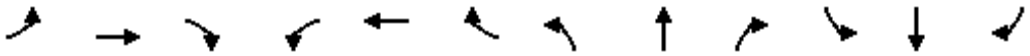
Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	22.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	115	21	0	0	0	23	230	99	37	261	39
Future Volume (vph)	16	115	21	0	0	0	23	230	99	37	261	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Lane Util. Factor	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99					1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98					1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1805					1770	1863	1553	1770	1863	1521
Flt Permitted	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1805					1770	1863	1553	1770	1863	1521
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	125	23	0	0	0	25	250	108	40	284	42
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	82	0	0	31
Lane Group Flow (vph)	17	137	0	0	0	0	25	250	26	40	284	11
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	18.0	18.0					4.0	11.1	11.1	4.8	11.9	11.9
Effective Green, g (s)	18.0	18.0					4.0	11.1	11.1	4.8	11.9	11.9
Actuated g/C Ratio	0.38	0.38					0.09	0.24	0.24	0.10	0.25	0.25
Clearance Time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Vehicle Extension (s)	3.0	3.0					3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	679	692					150	440	367	181	472	385
v/s Ratio Prot	0.01	c0.08					0.01	0.13		c0.02	c0.15	
v/s Ratio Perm									0.02			0.01
v/c Ratio	0.03	0.20					0.17	0.57	0.07	0.22	0.60	0.03
Uniform Delay, d1	9.0	9.6					19.9	15.8	13.9	19.3	15.4	13.2
Progression Factor	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.6					2.4	2.0	0.1	2.8	2.5	0.0
Delay (s)	9.1	10.3					22.3	17.8	14.0	22.1	17.9	13.2
Level of Service	A	B					C	B	B	C	B	B
Approach Delay (s)		10.2			0.0			17.0			17.8	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	46.9	Sum of lost time (s)	13.0
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

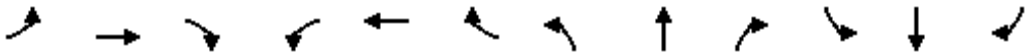
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	240	7	0	0	0	0	10	15	9	7	0
Future Volume (Veh/h)	5	240	7	0	0	0	0	10	15	9	7	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	261	8	0	0	0	0	11	16	10	8	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			269			279	275	134	162	279	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			269			279	275	134	162	279	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	98	98	99	99	100
cM capacity (veh/h)	1622			1292			644	629	890	761	626	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	136	138	27	18
Volume Left	5	0	0	10
Volume Right	0	8	16	0
cSH	1622	1700	761	695
Volume to Capacity	0.00	0.08	0.04	0.03
Queue Length 95th (ft)	0	0	3	2
Control Delay (s)	0.3	0.0	9.9	10.3
Lane LOS	A		A	B
Approach Delay (s)	0.1		9.9	10.3
Approach LOS			A	B

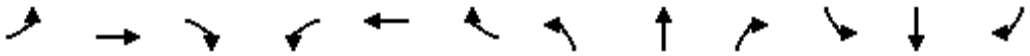
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	242	3	0	0	0	0	14	10	13	15	0
Future Volume (vph)	17	242	3	0	0	0	0	14	10	13	15	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	263	3	0	0	0	0	15	11	14	16	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	150	135	26	30
Volume Left (vph)	18	0	0	14
Volume Right (vph)	0	3	11	0
Hadj (s)	0.09	0.02	-0.22	0.13
Departure Headway (s)	4.7	4.7	4.4	4.7
Degree Utilization, x	0.20	0.17	0.03	0.04
Capacity (veh/h)	751	758	778	719
Control Delay (s)	7.7	7.4	7.5	7.9
Approach Delay (s)	7.6		7.5	7.9
Approach LOS	A		A	A

Intersection Summary				
Delay	7.6			
Level of Service	A			
Intersection Capacity Utilization	22.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	142	122	1	4	0	3	0	17	9	0	0	0
Future Volume (vph)	142	122	1	4	0	3	0	17	9	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	154	133	1	4	0	3	0	18	10	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	154	134	7	28
Volume Left (vph)	154	0	4	0
Volume Right (vph)	0	1	3	10
Hadj (s)	0.53	0.03	-0.11	-0.18
Departure Headway (s)	5.1	4.6	4.2	4.4
Degree Utilization, x	0.22	0.17	0.01	0.03
Capacity (veh/h)	698	769	833	773
Control Delay (s)	8.3	7.3	7.3	7.5
Approach Delay (s)	7.9		7.3	7.5
Approach LOS	A		A	A

Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	22.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	13	0	0	11	13	263	7	5	272	6
Future Volume (Veh/h)	0	0	13	0	0	11	13	263	7	5	272	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	14	0	0	12	14	286	8	5	296	7
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			440	
pX, platoon unblocked												
vC, conflicting volume	644	646	306	645	645	298	310			301		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	644	646	306	645	645	298	310			301		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	98	99			100		
cM capacity (veh/h)	370	380	729	368	380	737	1243			1253		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	14	12	14	294	5	303
Volume Left	0	0	14	0	5	0
Volume Right	14	12	0	8	0	7
cSH	729	737	1243	1700	1253	1700
Volume to Capacity	0.02	0.02	0.01	0.17	0.00	0.18
Queue Length 95th (ft)	1	1	1	0	0	0
Control Delay (s)	10.0	10.0	7.9	0.0	7.9	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	10.0	10.0	0.4		0.1	
Approach LOS	B	A				

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	24.7%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	4	1	7	0	15	3	3	0	5	278	8	0	2	290	5
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	4	1	8	0	17	3	3	0	6	308	9	0	2	322	6
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		13			23			323			330	
Entry Volume veh/h		13			23			317			324	
Circulating Flow (Vc), pc/h	341			318			7			26		
Exiting Flow (Vex), pc/h	12			15			315			347		
Capacity (cPCE), pc/h		804			822			1122			1101	
Capacity (c), veh/h		788			806			1100			1079	
v/c Ratio (X)		0.02			0.03			0.29			0.30	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.7			4.7			6.0			6.3	
Lane LOS		A			A			A			A	
95% Queue		0.0			0.1			1.2			1.3	
Approach Delay, s/veh	4.7			4.7			6.0			6.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.1						A					

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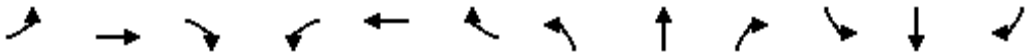
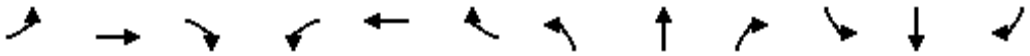


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	33	29	13	4	34	5	69	20	40	47	1
Future Volume (vph)	25	33	29	13	4	34	5	69	20	40	47	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	36	32	14	4	37	5	75	22	43	51	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	95	55	102	95
Volume Left (vph)	27	14	5	43
Volume Right (vph)	32	37	22	1
Hadj (s)	-0.11	-0.32	-0.09	0.12
Departure Headway (s)	4.3	4.1	4.3	4.5
Degree Utilization, x	0.11	0.06	0.12	0.12
Capacity (veh/h)	797	813	807	765
Control Delay (s)	7.8	7.4	7.8	8.1
Approach Delay (s)	7.8	7.4	7.8	8.1
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	24.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	126	10	2	58	10	5	12	13	14	17	7
Future Volume (Veh/h)	5	126	10	2	58	10	5	12	13	14	17	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	137	11	2	63	11	5	13	14	15	18	8
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	88			155			250	252	150	260	252	84
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88			155			250	252	150	260	252	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	98	98	98	97	99
cM capacity (veh/h)	1490			1417			667	637	892	653	637	964

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	153	76	32	41
Volume Left	5	2	5	15
Volume Right	11	11	14	8
cSH	1490	1417	734	689
Volume to Capacity	0.00	0.00	0.04	0.06
Queue Length 95th (ft)	0	0	3	5
Control Delay (s)	0.3	0.2	10.1	10.6
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.2	10.1	10.6
Approach LOS			B	B

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	21.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	36	26	92	0	42	14	13	0	45	257	30	0	8	283	12
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	40	29	102	0	47	16	14	0	50	285	33	0	9	314	13
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		171			77			368			336	
Entry Volume veh/h		168			75			361			329	
Circulating Flow (Vc), pc/h	370			375			78			113		
Exiting Flow (Vex), pc/h	71			79			339			463		
Capacity (cPCE), pc/h		781			777			1045			1009	
Capacity (c), veh/h		765			761			1025			989	
v/c Ratio (X)		0.22			0.10			0.35			0.33	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.1			5.7			7.2			7.1	
Lane LOS		A			A			A			A	
95% Queue		0.8			0.3			1.6			1.5	
Approach Delay, s/veh	7.1			5.7			7.2			7.1		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	7.0						A					

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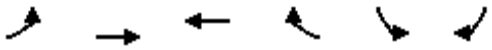
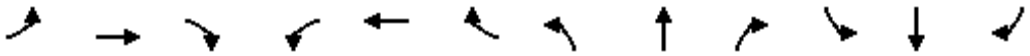


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	60	58	3	10	9
Future Volume (Veh/h)	5	60	58	3	10	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	65	63	3	11	10
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	74				148	74
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	74				148	74
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	99
cM capacity (veh/h)	1515				834	981

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	70	66	21
Volume Left	5	0	11
Volume Right	0	3	10
cSH	1515	1700	898
Volume to Capacity	0.00	0.04	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.6	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.6	0.0	9.1
Approach LOS			A

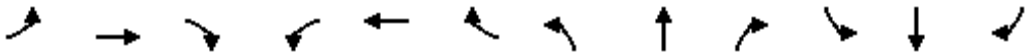
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	56	5	12	53	7	3	4	8	22	1	3
Future Volume (Veh/h)	4	56	5	12	53	7	3	4	8	22	1	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	61	5	13	58	8	3	4	9	24	1	3
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	68			66			165	166	64	172	164	66
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	68			66			165	166	64	172	164	66
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	99	99	97	100	100
cM capacity (veh/h)	1531			1536			787	718	1001	771	719	994

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	70	79	16	28
Volume Left	4	13	3	24
Volume Right	5	8	9	3
cSH	1531	1536	871	788
Volume to Capacity	0.00	0.01	0.02	0.04
Queue Length 95th (ft)	0	1	1	3
Control Delay (s)	0.4	1.3	9.2	9.7
Lane LOS	A	A	A	A
Approach Delay (s)	0.4	1.3	9.2	9.7
Approach LOS			A	A

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	19.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	33	52	20	42	0	28	0	10	0	2	0
Future Volume (vph)	0	33	52	20	42	0	28	0	10	0	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	36	57	22	46	0	30	0	11	0	2	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	93	68	41	2
Volume Left (vph)	0	22	30	0
Volume Right (vph)	57	0	11	0
Hadj (s)	-0.33	0.10	0.02	0.03
Departure Headway (s)	3.7	4.2	4.3	4.3
Degree Utilization, x	0.10	0.08	0.05	0.00
Capacity (veh/h)	945	846	808	798
Control Delay (s)	7.1	7.5	7.5	7.3
Approach Delay (s)	7.1	7.5	7.5	7.3
Approach LOS	A	A	A	A

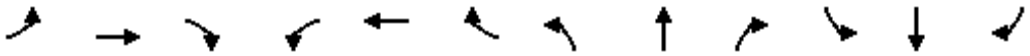
Intersection Summary				
Delay	7.3			
Level of Service	A			
Intersection Capacity Utilization	25.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	32	46	51	20	54	61
Future Volume (vph)	32	46	51	20	54	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	50	55	22	59	66

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	85	77	125
Volume Left (vph)	35	0	59
Volume Right (vph)	50	22	0
Hadj (s)	-0.24	-0.14	0.13
Departure Headway (s)	4.1	4.1	4.3
Degree Utilization, x	0.10	0.09	0.15
Capacity (veh/h)	834	851	818
Control Delay (s)	7.5	7.5	8.0
Approach Delay (s)	7.5	7.5	8.0
Approach LOS	A	A	A

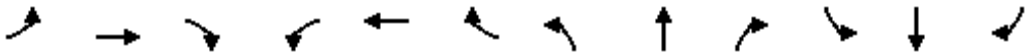
Intersection Summary			
Delay	7.7		
Level of Service	A		
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	132	1	6	106	22	6	7	11	22	11	5
Future Volume (Veh/h)	4	132	1	6	106	22	6	7	11	22	11	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	143	1	7	115	24	7	8	12	24	12	5
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.96						0.96	0.96		0.96	0.96	0.96
vC, conflicting volume	142			155			318	318	162	320	307	134
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	93			155			276	276	162	277	264	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	99	99	96	98	99
cM capacity (veh/h)	1446			1412			623	598	868	621	607	935

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	148	146	27	41
Volume Left	4	7	7	24
Volume Right	1	24	12	5
cSH	1446	1412	702	643
Volume to Capacity	0.00	0.00	0.04	0.06
Queue Length 95th (ft)	0	0	3	5
Control Delay (s)	0.2	0.4	10.3	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.4	10.3	11.0
Approach LOS			B	B

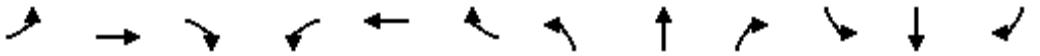
Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	97	52	113	98	109	27	216	60	119	274	11
Future Volume (vph)	15	97	52	113	98	109	27	216	60	119	274	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.96	1.00	1.00	0.93	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1851	1526	1681	1761	1465	1770	3411		1770	1847	
Flt Permitted		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1851	1526	1681	1761	1465	1770	3411		1770	1847	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	105	57	123	107	118	29	235	65	129	298	12
RTOR Reduction (vph)	0	0	51	0	0	103	0	19	0	0	1	0
Lane Group Flow (vph)	0	121	6	111	119	15	29	281	0	129	309	0
Confl. Peds. (#/hr)	14		10	10		14			3			15
Confl. Bikes (#/hr)			4			5			3			3
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		10.9	10.9	12.5	12.5	12.5	4.3	46.2		11.6	53.5	
Effective Green, g (s)		10.9	10.9	12.5	12.5	12.5	4.3	46.2		11.6	53.5	
Actuated g/C Ratio		0.11	0.11	0.12	0.12	0.12	0.04	0.46		0.12	0.54	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.5		2.0	3.5	
Lane Grp Cap (vph)		201	166	210	220	183	76	1575		205	988	
v/s Ratio Prot		c0.07		0.07	c0.07		0.02	0.08		c0.07	c0.17	
v/s Ratio Perm			0.00			0.01						
v/c Ratio		0.60	0.04	0.53	0.54	0.08	0.38	0.18		0.63	0.31	
Uniform Delay, d1		42.5	39.9	41.0	41.1	38.7	46.6	15.8		42.1	13.0	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.5	0.0	2.7	3.0	0.2	1.2	0.2		4.3	0.8	
Delay (s)		45.9	39.9	43.7	44.1	38.9	47.7	16.0		46.5	13.8	
Level of Service		D	D	D	D	D	D	B		D	B	
Approach Delay (s)		44.0			42.2			18.8			23.4	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	30.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

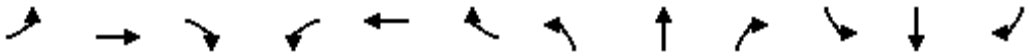
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	274	0	16	353	28	8	5	34	86	8	16
Future Volume (vph)	4	274	0	16	353	28	8	5	34	86	8	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3539		1765	3497			3095			1781	1551
Flt Permitted	0.82	1.00		0.82	1.00			0.94			1.00	1.00
Satd. Flow (perm)	1521	3539		1517	3497			2927			1862	1551
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	298	0	17	384	30	9	5	37	93	9	17
RTOR Reduction (vph)	0	0	0	0	13	0	0	31	0	0	0	14
Lane Group Flow (vph)	4	298	0	17	401	0	0	20	0	0	102	3
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	4.9	4.9		4.9	4.9			2.6			2.6	2.6
Effective Green, g (s)	4.9	4.9		4.9	4.9			2.6			2.6	2.6
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.15			0.15	0.15
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	438	1020		437	1007			447			284	237
v/s Ratio Prot		0.08			c0.11							
v/s Ratio Perm	0.00			0.01				0.01			c0.05	0.00
v/c Ratio	0.01	0.29		0.04	0.40			0.04			0.36	0.01
Uniform Delay, d1	4.3	4.7		4.4	4.9			6.1			6.5	6.1
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.0	0.2		0.0	0.3			0.1			1.1	0.0
Delay (s)	4.3	4.9		4.4	5.1			6.2			7.5	6.1
Level of Service	A	A		A	A			A			A	A
Approach Delay (s)		4.9			5.1			6.2			7.3	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	17.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

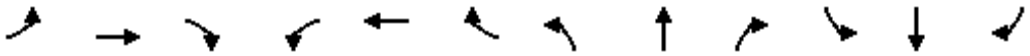
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	8	13	13	5	48	2	292	26	40	394	13
Future Volume (vph)	19	8	13	13	5	48	2	292	26	40	394	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1728			1794	1557	1770	3489		1770	3519	
Flt Permitted		1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1769			1860	1557	1770	3489		1770	3519	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	9	14	14	5	52	2	317	28	43	428	14
RTOR Reduction (vph)	0	13	0	0	0	48	0	8	0	0	3	0
Lane Group Flow (vph)	0	31	0	0	19	4	2	337	0	43	439	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		2.6			2.6	2.6	0.6	17.4		0.6	17.4	
Effective Green, g (s)		2.6			2.6	2.6	0.6	17.4		0.6	17.4	
Actuated g/C Ratio		0.08			0.08	0.08	0.02	0.51		0.02	0.51	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		134			140	118	30	1769		30	1785	
v/s Ratio Prot							0.00	0.10		c0.02	c0.12	
v/s Ratio Perm		c0.02			0.01	0.00						
v/c Ratio		0.23			0.14	0.03	0.07	0.19		1.43	0.25	
Uniform Delay, d1		14.9			14.8	14.7	16.6	4.6		16.8	4.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.2	0.0	0.9	0.1		317.1	0.1	
Delay (s)		15.2			15.0	14.7	17.5	4.7		333.9	4.8	
Level of Service		B			B	B	B	A		F	A	
Approach Delay (s)		15.2			14.8			4.7			34.0	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	34.3	Sum of lost time (s)	13.7
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

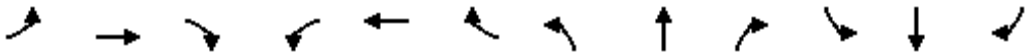
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	60	7	11	52	0	6	0	9	0	0	0
Future Volume (Veh/h)	0	60	7	11	52	0	6	0	9	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	65	8	12	57	0	7	0	10	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	57			73			150	150	69	160	154	57
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	57			73			150	150	69	160	154	57
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	100	99	100	100	100
cM capacity (veh/h)	1547			1527			813	736	994	793	732	1009

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	73	69	17	0
Volume Left	0	12	7	0
Volume Right	8	0	10	0
cSH	1547	1527	910	1700
Volume to Capacity	0.00	0.01	0.02	0.00
Queue Length 95th (ft)	0	1	1	0
Control Delay (s)	0.0	1.3	9.0	0.0
Lane LOS		A	A	A
Approach Delay (s)	0.0	1.3	9.0	0.0
Approach LOS			A	A

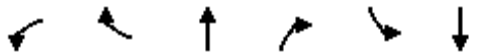
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	20.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	28	4	1	20	1	7	0	3	1	0	1
Future Volume (Veh/h)	1	28	4	1	20	1	7	0	3	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	30	4	1	22	1	8	0	3	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	23			34			60	59	32	62	60	22
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	23			34			60	59	32	62	60	22
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	100	100	100	100
cM capacity (veh/h)	1592			1578			935	831	1042	930	829	1054

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	35	24	11	2
Volume Left	1	1	8	1
Volume Right	4	1	3	1
cSH	1592	1578	962	988
Volume to Capacity	0.00	0.00	0.01	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.2	0.3	8.8	8.6
Lane LOS	A	A	A	A
Approach Delay (s)	0.2	0.3	8.8	8.6
Approach LOS			A	A

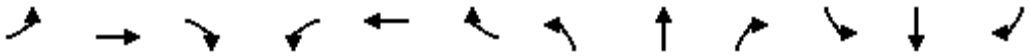
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	16	54	6	16	67	6
Future Volume (vph)	16	54	6	16	67	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	59	7	17	73	7

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	76	24	80
Volume Left (vph)	17	0	73
Volume Right (vph)	59	17	0
Hadj (s)	-0.39	-0.39	0.22
Departure Headway (s)	3.7	3.7	4.3
Degree Utilization, x	0.08	0.02	0.10
Capacity (veh/h)	933	927	820
Control Delay (s)	7.1	6.8	7.7
Approach Delay (s)	7.1	6.8	7.7
Approach LOS	A	A	A

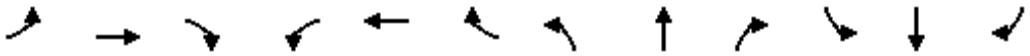
Intersection Summary			
Delay	7.3		
Level of Service	A		
Intersection Capacity Utilization	21.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	101	45	8	67	2	34	5	8	9	6	3
Future Volume (Veh/h)	2	101	45	8	67	2	34	5	8	9	6	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	110	49	9	73	2	37	5	9	10	7	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	75			159			237	232	134	242	255	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	75			159			237	232	134	242	255	74
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			95	99	99	99	99	100
cM capacity (veh/h)	1524			1420			705	663	914	697	644	988

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	161	84	51	20
Volume Left	2	9	37	10
Volume Right	49	2	9	3
cSH	1524	1420	730	708
Volume to Capacity	0.00	0.01	0.07	0.03
Queue Length 95th (ft)	0	0	6	2
Control Delay (s)	0.1	0.9	10.3	10.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.9	10.3	10.2
Approach LOS			B	B

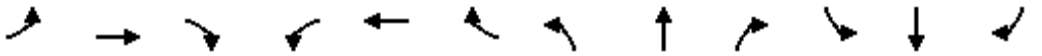
Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	116	7	5	72	10	2	3	14	4	4	3
Future Volume (Veh/h)	0	116	7	5	72	10	2	3	14	4	4	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	126	8	5	78	11	2	3	15	4	4	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	89			134			228	229	130	240	228	84
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			134			228	229	130	240	228	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	99	99	100
cM capacity (veh/h)	1506			1451			719	668	920	698	670	976

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	134	94	20	11
Volume Left	0	5	2	4
Volume Right	8	11	15	3
cSH	1506	1451	848	744
Volume to Capacity	0.00	0.00	0.02	0.01
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	0.4	9.3	9.9
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.4	9.3	9.9
Approach LOS			A	A

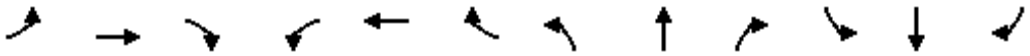
Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	18.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	69	45	35	32	17	57	269	32	40	295	11
Future Volume (vph)	24	69	45	35	32	17	57	269	32	40	295	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.96			0.97		1.00	0.98		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1765			1776		1770	3482		1770	3520	
Flt Permitted		0.92			0.89		0.95	1.00		0.55	1.00	
Satd. Flow (perm)		1635			1621		1770	3482		1032	3520	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	75	49	38	35	18	62	292	35	43	321	12
RTOR Reduction (vph)	0	29	0	0	15	0	0	13	0	0	3	0
Lane Group Flow (vph)	0	121	0	0	76	0	62	314	0	43	330	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		5.2			4.8		2.2	21.9		15.5	15.5	
Effective Green, g (s)		5.2			4.8		2.2	21.9		15.5	15.5	
Actuated g/C Ratio		0.14			0.13		0.06	0.60		0.42	0.42	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		231			212		106	2077		435	1486	
v/s Ratio Prot							c0.04	0.09			c0.09	
v/s Ratio Perm		c0.07			0.05					0.04		
v/c Ratio		0.52			0.36		0.58	0.15		0.10	0.22	
Uniform Delay, d1		14.6			14.5		16.8	3.3		6.4	6.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.1			1.2		5.2	0.0		0.1	0.1	
Delay (s)		16.7			15.8		22.0	3.3		6.5	6.8	
Level of Service		B			B		C	A		A	A	
Approach Delay (s)		16.7			15.8			6.3			6.8	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	36.7	Sum of lost time (s)	14.2
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

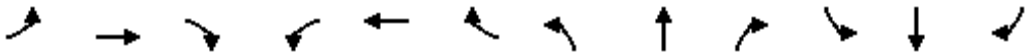
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	136	5	6	77	5	2	6	5	4	5	7
Future Volume (Veh/h)	6	136	5	6	77	5	2	6	5	4	5	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	148	5	7	84	5	2	7	5	4	5	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	89			153			276	268	150	274	268	86
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			153			276	268	150	274	268	86
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	99	99	99	99
cM capacity (veh/h)	1506			1428			662	632	896	665	632	972

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	160	96	14	17
Volume Left	7	7	2	4
Volume Right	5	5	5	8
cSH	1506	1428	712	767
Volume to Capacity	0.00	0.00	0.02	0.02
Queue Length 95th (ft)	0	0	2	2
Control Delay (s)	0.4	0.6	10.2	9.8
Lane LOS	A	A	B	A
Approach Delay (s)	0.4	0.6	10.2	9.8
Approach LOS			B	A

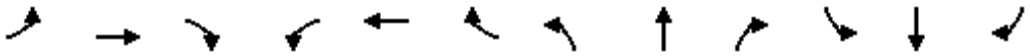
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	152	5	3	93	1	4	8	7	5	4	3
Future Volume (vph)	2	152	5	3	93	1	4	8	7	5	4	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	165	5	3	101	1	4	9	8	5	4	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	172	105	21	12
Volume Left (vph)	2	3	4	5
Volume Right (vph)	5	1	8	3
Hadj (s)	0.02	0.03	-0.16	-0.03
Departure Headway (s)	4.1	4.2	4.4	4.5
Degree Utilization, x	0.20	0.12	0.03	0.01
Capacity (veh/h)	864	846	770	741
Control Delay (s)	8.1	7.8	7.5	7.6
Approach Delay (s)	8.1	7.8	7.5	7.6
Approach LOS	A	A	A	A

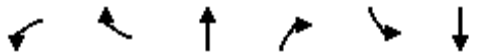
Intersection Summary				
Delay	7.9			
Level of Service	A			
Intersection Capacity Utilization	19.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	173	4	21	79	12	4	33	88	93	6	5
Future Volume (vph)	5	173	4	21	79	12	4	33	88	93	6	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	188	4	23	86	13	4	36	96	101	7	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	197	122	136	113
Volume Left (vph)	5	23	4	101
Volume Right (vph)	4	13	96	5
Hadj (s)	0.03	0.01	-0.38	0.19
Departure Headway (s)	4.7	4.8	4.5	5.0
Degree Utilization, x	0.26	0.16	0.17	0.16
Capacity (veh/h)	719	702	748	660
Control Delay (s)	9.3	8.7	8.4	9.0
Approach Delay (s)	9.3	8.7	8.4	9.0
Approach LOS	A	A	A	A

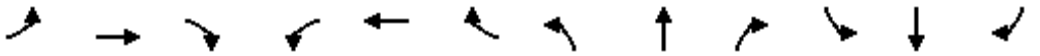
Intersection Summary			
Delay	8.9		
Level of Service	A		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	4	23	14	6	32	28
Future Volume (vph)	4	23	14	6	32	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	25	15	7	35	30

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	29	22	65
Volume Left (vph)	4	0	35
Volume Right (vph)	25	7	0
Hadj (s)	-0.46	-0.16	0.14
Departure Headway (s)	3.6	3.9	4.1
Degree Utilization, x	0.03	0.02	0.07
Capacity (veh/h)	963	909	863
Control Delay (s)	6.7	7.0	7.4
Approach Delay (s)	6.7	7.0	7.4
Approach LOS	A	A	A

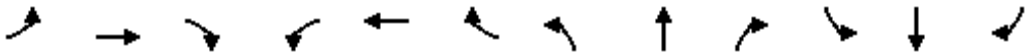
Intersection Summary			
Delay	7.2		
Level of Service	A		
Intersection Capacity Utilization	19.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	81	26	218	33	185	19	163	104	157	230	4
Future Volume (vph)	10	81	26	218	33	185	19	163	104	157	230	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1553		1785	1583	1770	3286		1770	3529	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1553		1785	1583	1770	3286		1770	3529	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	88	28	237	36	201	21	177	113	171	250	4
RTOR Reduction (vph)	0	0	26	0	0	165	0	67	0	0	1	0
Lane Group Flow (vph)	11	88	2	0	273	36	21	223	0	171	253	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	Over	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	5.6	5.6	5.6		16.8	12.0	2.2	14.0		12.0	23.8	
Effective Green, g (s)	5.6	5.6	5.6		16.8	12.0	2.2	14.0		12.0	23.8	
Actuated g/C Ratio	0.08	0.08	0.08		0.25	0.18	0.03	0.21		0.18	0.35	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	146	154	128		444	281	57	681		314	1244	
v/s Ratio Prot	0.01	c0.05			c0.15	0.02	0.01	c0.07		c0.10	0.07	
v/s Ratio Perm			0.00									
v/c Ratio	0.08	0.57	0.02		0.61	0.13	0.37	0.33		0.54	0.20	
Uniform Delay, d1	28.6	29.8	28.4		22.5	23.3	32.0	22.7		25.3	15.2	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	3.2	0.0		2.5	0.1	1.5	0.3		1.0	0.1	
Delay (s)	28.6	33.0	28.4		25.0	23.4	33.4	23.0		26.3	15.3	
Level of Service	C	C	C		C	C	C	C		C	B	
Approach Delay (s)		31.6			24.3			23.7			19.7	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	67.5	Sum of lost time (s)	19.1
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

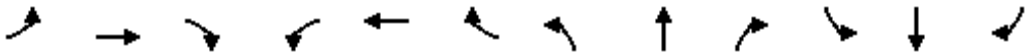
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	300	1	3	447	18	0	0	5	10	0	11
Future Volume (Veh/h)	3	300	1	3	447	18	0	0	5	10	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	326	1	3	486	20	0	0	5	11	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.98			0.98	0.98	0.98	0.98	0.98	
vC, conflicting volume	506			327			846	844	326	840	835	496
vC1, stage 1 conf vol							332	332		502	502	
vC2, stage 2 conf vol							514	512		338	333	
vCu, unblocked vol	506			301			832	830	300	825	820	496
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	98	100	98
cM capacity (veh/h)	1059			1233			468	470	723	480	475	574

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	330	509	5	23
Volume Left	3	3	0	11
Volume Right	1	20	5	12
cSH	1059	1233	723	525
Volume to Capacity	0.00	0.00	0.01	0.04
Queue Length 95th (ft)	0	0	1	3
Control Delay (s)	0.1	0.1	10.0	12.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.1	10.0	12.2
Approach LOS			B	B

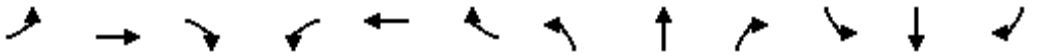
Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	41.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	315	2	6	496	10	2	1	13	12	1	6
Future Volume (Veh/h)	4	315	2	6	496	10	2	1	13	12	1	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	342	2	7	539	11	2	1	14	13	1	7
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked												
vC, conflicting volume	550			345			919	916	344	924	912	546
vC1, stage 1 conf vol							352	352		558	558	
vC2, stage 2 conf vol							567	564		366	353	
vCu, unblocked vol	550			345			919	916	344	924	912	546
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	98	97	100	99
cM capacity (veh/h)	1020			1213			438	444	698	441	446	537

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	348	557	17	21
Volume Left	4	7	2	13
Volume Right	2	11	14	7
cSH	1020	1213	633	469
Volume to Capacity	0.00	0.01	0.03	0.04
Queue Length 95th (ft)	0	0	2	4
Control Delay (s)	0.1	0.2	10.8	13.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.2	10.8	13.0
Approach LOS			B	B

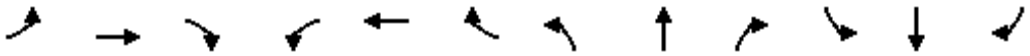
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	40.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	386	1	6	498	66	0	0	5	1	0	10
Future Volume (Veh/h)	14	386	1	6	498	66	0	0	5	1	0	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	420	1	7	541	72	0	0	5	1	0	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	613			421			1016	1078	420	1046	1042	577
vC1, stage 1 conf vol							450	450		591	591	
vC2, stage 2 conf vol							566	627		456	451	
vCu, unblocked vol	613			421			1016	1078	420	1046	1042	577
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			100	100	99	100	100	98
cM capacity (veh/h)	966			1138			406	394	633	405	411	516

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	436	7	613	5	12
Volume Left	15	7	0	0	1
Volume Right	1	0	72	5	11
cSH	966	1138	1700	633	505
Volume to Capacity	0.02	0.01	0.36	0.01	0.02
Queue Length 95th (ft)	1	0	0	1	2
Control Delay (s)	0.5	8.2	0.0	10.7	12.3
Lane LOS	A	A		B	B
Approach Delay (s)	0.5	0.1		10.7	12.3
Approach LOS				B	B

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	33	5	0	5	14	222	4	7	502	5
Future Volume (Veh/h)	0	0	33	5	0	5	14	222	4	7	502	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	36	5	0	5	15	241	4	8	546	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	720	840	548	871	840	122	551			245		
vC1, stage 1 conf vol	564	564		273	273							
vC2, stage 2 conf vol	156	275		598	567							
vCu, unblocked vol	720	840	548	871	840	122	551			245		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	99	100	99	99			99		
cM capacity (veh/h)	451	457	480	378	448	906	1015			1318		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	36	10	15	161	84	8	551
Volume Left	0	5	15	0	0	8	0
Volume Right	36	5	0	0	4	0	5
cSH	480	533	1015	1700	1700	1318	1700
Volume to Capacity	0.08	0.02	0.01	0.09	0.05	0.01	0.32
Queue Length 95th (ft)	6	1	1	0	0	0	0
Control Delay (s)	13.1	11.9	8.6	0.0	0.0	7.7	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	13.1	11.9	0.5			0.1	
Approach LOS	B	B					

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	56	8	23	0	30	9	5	0	14	301	4	0	4	295	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	62	9	26	0	33	10	6	0	16	334	4	0	4	327	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		97			49			354			350	
Entry Volume veh/h		95			48			347			343	
Circulating Flow (Vc), pc/h	364			412			75			59		
Exiting Flow (Vex), pc/h	17			45			402			386		
Capacity (cPCE), pc/h		785			748			1048			1065	
Capacity (c), veh/h		770			734			1028			1044	
v/c Ratio (X)		0.12			0.07			0.34			0.33	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.0			5.6			7.0			6.8	
Lane LOS		A			A			A			A	
95% Queue		0.4			0.2			1.5			1.4	
Approach Delay, s/veh	6.0			5.6			7.0			6.8		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.7						A					

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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	275	188	948	561	0	0
Future Volume (veh/h)	275	188	948	561	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863		
Adj Flow Rate, veh/h	299	204	1030	610		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1416	633	1377	3185		
Arrive On Green	0.40	0.40	0.40	0.90		
Sat Flow, veh/h	3632	1583	3442	3632		
Grp Volume(v), veh/h	299	204	1030	610		
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770		
Q Serve(g_s), s	2.2	3.5	10.3	0.8		
Cycle Q Clear(g_c), s	2.2	3.5	10.3	0.8		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1416	633	1377	3185		
V/C Ratio(X)	0.21	0.32	0.75	0.19		
Avail Cap(c_a), veh/h	1416	633	1377	3185		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	7.9	8.3	10.3	0.2		
Incr Delay (d2), s/veh	0.3	1.3	3.8	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.1	1.8	5.4	0.4		
LnGrp Delay(d),s/veh	8.2	9.6	14.0	0.4		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	503			1640		
Approach Delay, s/veh	8.8			9.0		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			20.0	20.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s			12.3	5.5				2.8
Green Ext Time (p_c), s			1.6	1.9				4.7

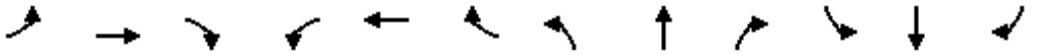
Intersection Summary	
HCM 2010 Ctrl Delay	8.9
HCM 2010 LOS	A



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	466	79	980	1434	79	1
Future Volume (veh/h)	466	79	980	1434	79	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	507	86	1065	1559	86	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	871	390	1112	2232	437	390
Arrive On Green	0.25	0.25	0.32	0.63	0.25	0.00
Sat Flow, veh/h	3632	1583	3442	3632	1774	1583
Grp Volume(v), veh/h	507	86	1065	1559	86	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770	1774	1583
Q Serve(g_s), s	8.2	2.8	19.7	18.9	2.5	0.0
Cycle Q Clear(g_c), s	8.2	2.8	19.7	18.9	2.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	871	390	1112	2232	437	390
V/C Ratio(X)	0.58	0.22	0.96	0.70	0.20	0.00
Avail Cap(c_a), veh/h	871	390	1112	2232	437	390
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	21.6	19.5	21.6	7.9	19.4	0.0
Incr Delay (d2), s/veh	2.8	1.3	18.6	1.8	1.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.4	1.4	12.2	9.7	1.3	0.0
LnGrp Delay(d),s/veh	24.4	20.8	40.1	9.8	20.4	0.0
LnGrp LOS	C	C	D	A	C	
Approach Vol, veh/h	593			2624	86	
Approach Delay, s/veh	23.9			22.1	20.4	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	25.0	20.0				45.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	21.0	16.0				41.0
Max Q Clear Time (g_c+I1), s		4.5	21.7	10.2				20.9
Green Ext Time (p_c), s		0.1	0.0	1.8				12.2

Intersection Summary	
HCM 2010 Ctrl Delay	22.4
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	502	6	183	871	718	17	0	219	90	71	82
Future Volume (veh/h)	0	502	6	183	871	718	17	0	219	90	71	82
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	1863	1863	0	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	546	7	199	947	0	18	0	238	88	92	89
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1101	14	273	1906	853	0	0	0	546	573	487
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3672	46	1774	3539	1583		0		1774	1863	1583
Grp Volume(v), veh/h	0	270	283	199	947	0		0.0		88	92	89
Grp Sat Flow(s),veh/h/ln	0	1770	1855	1774	1770	1583				1774	1863	1583
Q Serve(g_s), s	0.0	6.5	6.5	5.6	8.8	0.0				1.9	1.9	2.1
Cycle Q Clear(g_c), s	0.0	6.5	6.5	5.6	8.8	0.0				1.9	1.9	2.1
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	544	571	273	1906	853				546	573	487
V/C Ratio(X)	0.00	0.50	0.50	0.73	0.50	0.00				0.16	0.16	0.18
Avail Cap(c_a), veh/h	0	544	571	273	1906	853				546	573	487
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	14.7	14.7	21.0	7.6	0.0				13.1	13.1	13.2
Incr Delay (d2), s/veh	0.0	3.2	3.1	15.7	0.9	0.0				0.6	0.6	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.6	3.8	3.9	4.5	0.0				1.0	1.0	1.1
LnGrp Delay(d),s/veh	0.0	17.9	17.8	36.7	8.5	0.0				13.7	13.7	14.0
LnGrp LOS		B	B	D	A					B	B	B
Approach Vol, veh/h		553			1146						269	
Approach Delay, s/veh		17.8			13.4						13.8	
Approach LOS		B			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			7.6	8.5		4.1		10.8
Green Ext Time (p_c), s			0.0	2.0		0.8		6.4

Intersection Summary	
HCM 2010 Ctrl Delay	14.7
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	325	393	13	22	517	506	24	29	48	197	5	80
Future Volume (veh/h)	325	393	13	22	517	506	24	29	48	197	5	80
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	353	427	14	24	562	550	26	32	52	153	90	87
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	355	1180	39	111	708	633	163	201	317	355	174	169
Arrive On Green	0.20	0.34	0.34	0.06	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1774	3498	114	1774	3539	1583	817	1005	1583	1774	872	843
Grp Volume(v), veh/h	353	216	225	24	562	550	58	0	52	153	0	177
Grp Sat Flow(s),veh/h/ln	1774	1770	1843	1774	1770	1583	1822	0	1583	1774	0	1714
Q Serve(g_s), s	15.9	7.4	7.4	1.0	12.1	16.0	2.1	0.0	2.2	6.0	0.0	7.4
Cycle Q Clear(g_c), s	15.9	7.4	7.4	1.0	12.1	16.0	2.1	0.0	2.2	6.0	0.0	7.4
Prop In Lane	1.00		0.06	1.00		1.00	0.45		1.00	1.00		0.49
Lane Grp Cap(c), veh/h	355	597	622	111	708	633	364	0	317	355	0	343
V/C Ratio(X)	0.99	0.36	0.36	0.22	0.79	0.87	0.16	0.00	0.16	0.43	0.00	0.52
Avail Cap(c_a), veh/h	355	597	622	111	708	633	364	0	317	355	0	343
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.0	20.0	20.0	35.6	30.4	19.2	26.4	0.0	26.5	28.0	0.0	28.5
Incr Delay (d2), s/veh	46.5	1.7	1.6	4.4	8.9	15.0	0.9	0.0	1.1	3.8	0.0	5.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.3	3.9	4.0	0.6	6.7	14.7	1.2	0.0	1.1	3.3	0.0	4.0
LnGrp Delay(d),s/veh	78.5	21.7	21.6	40.1	39.4	34.2	27.4	0.0	27.6	31.8	0.0	34.0
LnGrp LOS	E	C	C	D	D	C	C		C	C		C
Approach Vol, veh/h		794			1136			110			330	
Approach Delay, s/veh		46.9			36.9			27.5			33.0	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	31.0		20.0	20.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	27.0		16.0	16.0	16.0
Max Q Clear Time (g_c+I1), s		4.2	3.0	9.4		9.4	17.9	18.0
Green Ext Time (p_c), s		0.3	0.0	2.4		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	39.3
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	378	143	43	748	257	127	74	41	316	155	223
Future Volume (veh/h)	86	378	143	43	748	257	127	74	41	316	155	223
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	93	411	155	47	813	279	109	121	45	256	290	242
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	101	613	229	101	860	385	431	452	385	405	426	362
Arrive On Green	0.06	0.24	0.24	0.06	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23
Sat Flow, veh/h	1774	2525	942	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	93	287	279	47	813	279	109	121	45	256	290	242
Grp Sat Flow(s),veh/h/ln	1774	1770	1697	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.7	10.2	10.4	1.8	15.8	11.3	3.5	3.7	1.6	9.1	10.0	9.7
Cycle Q Clear(g_c), s	3.7	10.2	10.4	1.8	15.8	11.3	3.5	3.7	1.6	9.1	10.0	9.7
Prop In Lane	1.00		0.56	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	101	430	412	101	860	385	431	452	385	405	426	362
V/C Ratio(X)	0.92	0.67	0.68	0.46	0.95	0.73	0.25	0.27	0.12	0.63	0.68	0.67
Avail Cap(c_a), veh/h	101	430	412	101	860	385	431	452	385	405	426	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.8	23.9	24.0	32.0	26.0	24.4	21.4	21.5	20.7	24.3	24.7	24.6
Incr Delay (d2), s/veh	69.0	8.0	8.7	14.5	20.1	11.3	1.4	1.4	0.6	7.3	8.5	9.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	6.0	5.9	1.3	10.1	6.2	1.9	2.1	0.7	5.2	6.1	5.2
LnGrp Delay(d),s/veh	101.9	31.9	32.7	46.4	46.1	35.7	22.8	22.9	21.3	31.6	33.2	34.0
LnGrp LOS	F	C	C	D	D	D	C	C	C	C	C	C
Approach Vol, veh/h		659			1139			275			788	
Approach Delay, s/veh		42.1			43.6			22.6			32.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	8.0	21.0		20.0	8.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	17.0		16.0	4.0	17.0
Max Q Clear Time (g_c+I1), s		5.7	3.8	12.4		12.0	5.7	17.8
Green Ext Time (p_c), s		0.8	0.0	1.4		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	38.3
HCM 2010 LOS	D

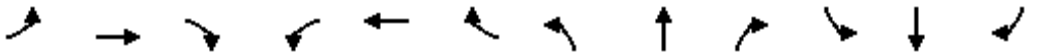
Notes

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	43	93	13	62	70	165	3	84	22	0	0	0
Future Vol, veh/h	43	93	13	62	70	165	3	84	22	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	101	14	67	76	179	3	91	24	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.8	9.5	8.8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	3%	29%	21%
Vol Thru, %	77%	62%	24%
Vol Right, %	20%	9%	56%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	109	149	297
LT Vol	3	43	62
Through Vol	84	93	70
RT Vol	22	13	165
Lane Flow Rate	118	162	323
Geometry Grp	1	1	1
Degree of Util (X)	0.16	0.205	0.369
Departure Headway (Hd)	4.852	4.559	4.119
Convergence, Y/N	Yes	Yes	Yes
Cap	738	787	875
Service Time	2.887	2.588	2.141
HCM Lane V/C Ratio	0.16	0.206	0.369
HCM Control Delay	8.8	8.8	9.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.6	0.8	1.7



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	258	103	163	362	295	1429	180	29	136	103	57	74
Future Volume (vph)	258	103	163	362	295	1429	180	29	136	103	57	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3030	1441		1786	1583		1805	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3030	1441		1786	1583		1805	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	280	112	177	393	321	1553	196	32	148	112	62	80
RTOR Reduction (vph)	0	0	150	0	500	573	0	0	114	0	0	65
Lane Group Flow (vph)	280	112	27	393	598	203	0	228	34	0	174	15
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.0	13.3	13.3	17.0	19.9	19.9		20.2	20.2		16.0	16.0
Effective Green, g (s)	14.0	13.3	13.3	17.0	19.9	19.9		20.2	20.2		16.0	16.0
Actuated g/C Ratio	0.16	0.15	0.15	0.19	0.23	0.23		0.23	0.23		0.18	0.18
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	283	283	241	344	690	328		413	366		330	290
v/s Ratio Prot	0.16	0.06		c0.22	c0.20			c0.13			c0.10	
v/s Ratio Perm			0.02			0.14			0.02			0.01
v/c Ratio	0.99	0.40	0.11	1.14	0.87	0.62		0.55	0.09		0.53	0.05
Uniform Delay, d1	36.6	33.4	31.9	35.1	32.4	30.3		29.6	26.4		32.2	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	50.0	0.3	0.1	93.0	10.7	2.4		5.2	0.5		5.9	0.3
Delay (s)	86.6	33.7	32.0	128.2	43.1	32.7		34.8	26.9		38.2	29.7
Level of Service	F	C	C	F	D	C		C	C		D	C
Approach Delay (s)		59.2			54.3			31.7			35.5	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	51.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	20.8
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	5	0	526	0	205	0	5	280	536	0	353	359	2
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	6	0	583	0	223	0	6	310	594	0	391	398	2
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		6		0	583	223		316	594	391	400	
Entry Volume veh/h		6		0	572	223		310	582	383	392	
Circulating Flow (Vc), pc/h	1372			316			391			589		
Exiting Flow (Vex), pc/h	391			8			310			987		
Capacity (cPCE), pc/h		287		892	906			859		726	748	
Capacity (c), veh/h		281		874	888			843		712	734	
v/c Ratio (X)		0.02		0.00	0.64			0.37		0.54	0.53	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		13.2		4.1	14.3	0.0		8.6	0.0	13.5	13.1	
Lane LOS		B		A	B	A		A	A	B	B	
95% Queue		0.1		0.0	4.8			1.7		3.2	3.2	
Approach Delay, s/veh	13.2			10.3			3.0			13.3		
Approach LOS	B			B			A			B		
Intersection Delay, s/veh / LOS	8.6						A					

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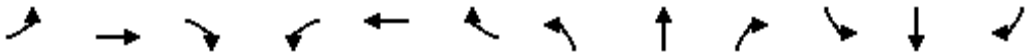
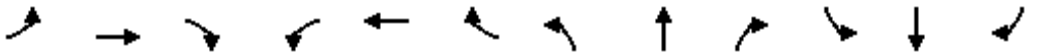


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	38	26	62	65	100	41	78	65	115	106	25
Future Volume (vph)	1	38	26	62	65	100	41	78	65	115	106	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	41	28	67	71	109	45	85	71	125	115	27

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	70	247	201	267
Volume Left (vph)	1	67	45	125
Volume Right (vph)	28	109	71	27
Hadj (s)	-0.20	-0.18	-0.13	0.07
Departure Headway (s)	5.3	5.0	5.0	5.1
Degree Utilization, x	0.10	0.35	0.28	0.38
Capacity (veh/h)	592	658	668	662
Control Delay (s)	8.9	10.7	9.9	11.2
Approach Delay (s)	8.9	10.7	9.9	11.2
Approach LOS	A	B	A	B

Intersection Summary				
Delay	10.5			
Level of Service	B			
Intersection Capacity Utilization	52.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	162	50	68	11	44	27	48	554	17	43	560	117
Future Volume (vph)	162	50	68	11	44	27	48	554	17	43	560	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	2.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1794	1583		1769		1770	1855		1770	1863	1583
Flt Permitted		0.76	1.00		0.96		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1419	1583		1717		1770	1855		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	54	74	12	48	29	52	602	18	47	609	127
RTOR Reduction (vph)	0	0	53	0	21	0	0	1	0	0	0	58
Lane Group Flow (vph)	0	230	21	0	68	0	52	619	0	47	609	69
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		19.0	19.0		19.0		5.7	27.7		10.1	36.9	36.9
Effective Green, g (s)		19.0	19.0		19.0		5.7	27.7		10.1	36.9	36.9
Actuated g/C Ratio		0.28	0.28		0.28		0.08	0.41		0.15	0.55	0.55
Clearance Time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	2.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		3.0	7.0	7.0
Lane Grp Cap (vph)		398	444		482		149	760		264	1016	864
v/s Ratio Prot							c0.03	c0.33		0.03	c0.33	
v/s Ratio Perm		c0.16	0.01		0.04							0.04
v/c Ratio		0.58	0.05		0.14		0.35	0.81		0.18	0.60	0.08
Uniform Delay, d1		20.9	17.7		18.2		29.2	17.7		25.1	10.4	7.3
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		4.8	0.2		0.5		1.4	6.7		0.3	2.1	0.1
Delay (s)		25.7	17.9		18.7		30.6	24.4		25.4	12.5	7.4
Level of Service		C	B		B		C	C		C	B	A
Approach Delay (s)		23.8			18.7			24.8			12.4	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	67.6	Sum of lost time (s)	10.8
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	26	29	23	0	29	34	65	0	19	548	53	0	36	572	22
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	29	32	26	0	32	38	72	0	21	608	59	0	40	634	24
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		87			142			688			698	
Entry Volume veh/h		85			139			675			684	
Circulating Flow (Vc), pc/h	706			658			101			91		
Exiting Flow (Vex), pc/h	131			83			709			692		
Capacity (cPCE), pc/h		558			585			1021			1032	
Capacity (c), veh/h		547			574			1001			1011	
v/c Ratio (X)		0.16			0.24			0.67			0.68	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.6			9.5			14.0			14.0	
Lane LOS		A			A			B			B	
95% Queue		0.5			0.9			5.5			5.5	
Approach Delay, s/veh	8.6			9.5			14.0			14.0		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	13.3						B					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/12/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	38	30	42	0	18	30	51	0	32	531	42	0	23	531	72
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	42	33	47	0	20	33	57	0	35	589	47	0	26	589	80
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		122			110			671			695	
Entry Volume veh/h		120			108			658			681	
Circulating Flow (Vc), pc/h	635			666			101			88		
Exiting Flow (Vex), pc/h	106			148			688			656		
Capacity (cPCE), pc/h		599			581			1021			1035	
Capacity (c), veh/h		587			569			1001			1015	
v/c Ratio (X)		0.20			0.19			0.66			0.67	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.7			8.7			13.5			13.8	
Lane LOS		A			A			B			B	
95% Queue		0.8			0.7			5.1			5.4	
Approach Delay, s/veh	8.7			8.7			13.5			13.8		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	12.9						B					

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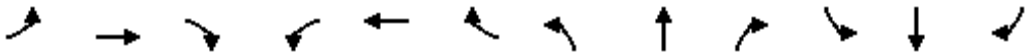
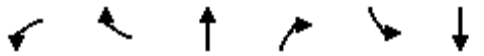


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	32	13	116	107	13	18	40	250	50	18	225	10
Future Volume (vph)	32	13	116	107	13	18	40	250	50	18	225	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	14	126	116	14	20	43	272	54	20	245	11

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	49	126	150	179	190	143	134
Volume Left (vph)	35	0	116	43	0	20	0
Volume Right (vph)	0	126	20	0	54	0	11
Hadj (s)	0.39	-0.67	0.11	0.15	-0.16	0.10	-0.02
Departure Headway (s)	6.8	5.8	6.5	6.1	5.7	6.1	6.0
Degree Utilization, x	0.09	0.20	0.27	0.30	0.30	0.24	0.22
Capacity (veh/h)	485	571	515	570	600	555	568
Control Delay (s)	9.3	9.0	11.9	10.5	10.0	9.9	9.5
Approach Delay (s)	9.1		11.9	10.2		9.7	
Approach LOS	A		B	B		A	

Intersection Summary				
Delay	10.1			
Level of Service	B			
Intersection Capacity Utilization	41.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	181	81	106	126	59	124
Future Volume (vph)	181	81	106	126	59	124
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	197	88	115	137	64	135

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	197	88	252	199
Volume Left (vph)	197	0	0	64
Volume Right (vph)	0	88	137	0
Hadj (s)	0.53	-0.67	-0.29	0.10
Departure Headway (s)	6.1	4.9	4.7	5.1
Degree Utilization, x	0.34	0.12	0.33	0.28
Capacity (veh/h)	555	684	732	665
Control Delay (s)	11.0	7.4	9.9	10.1
Approach Delay (s)	9.9		9.9	10.1
Approach LOS	A		A	B

Intersection Summary			
Delay	10.0		
Level of Service	A		
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Year 2013 No Project

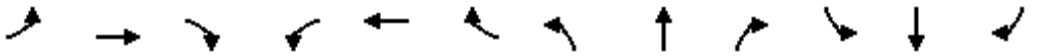
Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #9 Cleveland Street and Mission Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.292
Loss Time (sec):	0	Average Delay (sec/veh):	10.6
Optimal Cycle:	0	Level Of Service:	B

Street Name:	Cleveland Street						Mission Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1 0	0 1		0 0 1!	0 0		1 0 1	1 0		1 0 1	1 0	
Volume Module:												
Base Vol:	43	38	58	72	29	59	28	224	33	93	204	63
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	43	38	58	72	29	59	28	224	33	93	204	63
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	43	38	58	72	29	59	28	224	33	93	204	63
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	43	38	58	72	29	59	28	224	33	93	204	63
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	43	38	58	72	29	59	28	224	33	93	204	63
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.53	0.47	1.00	0.45	0.18	0.37	1.00	1.74	0.26	1.00	1.53	0.47
Final Sat.:	268	237	584	247	99	202	504	961	144	519	872	279
Capacity Analysis Module:												
Vol/Sat:	0.16	0.16	0.10	0.29	0.29	0.29	0.06	0.23	0.23	0.18	0.23	0.23
Crit Moves:	****			****			****			****		
Delay/Veh:	10.6	10.6	9.0	11.6	11.6	11.6	9.9	10.7	10.5	10.7	10.5	10.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	10.6	10.6	9.0	11.6	11.6	11.6	9.9	10.7	10.5	10.7	10.5	10.1
LOS by Move:	B	B	A	B	B	B	A	B	B	B	B	B
ApproachDel:	9.9			11.6			10.6			10.5		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	9.9			11.6			10.6			10.5		
LOS by Appr:	A			B			B			B		
AllWayAvgQ:	0.2	0.2	0.1	0.4	0.4	0.4	0.1	0.3	0.3	0.2	0.3	0.3

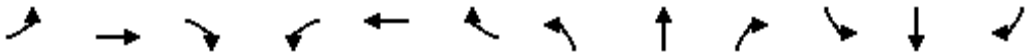
Note: Queue reported is the number of cars per lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	0	65	137	380	121	53	507	0	0	426	61
Future Volume (vph)	43	0	65	137	380	121	53	507	0	0	426	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	0.95		1.00	1.00			0.95	0.95
Frpb, ped/bikes	1.00		0.96	1.00	0.99		1.00	1.00			1.00	0.97
Flpb, ped/bikes	0.99		1.00	0.98	1.00		1.00	1.00			1.00	1.00
Frt	1.00		0.85	1.00	0.96		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1756		1522	1737	3381		1770	1863			1765	1461
Flt Permitted	0.42		1.00	0.95	1.00		0.32	1.00			1.00	1.00
Satd. Flow (perm)	779		1522	1737	3381		589	1863			1765	1461
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	0	71	149	413	132	58	551	0	0	463	66
RTOR Reduction (vph)	0	0	41	0	44	0	0	0	0	0	1	31
Lane Group Flow (vph)	47	0	30	149	501	0	58	551	0	0	469	28
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type	Perm		Perm	Perm	NA		Perm	NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases	4		4	8			2					6
Actuated Green, G (s)	25.5		25.5	25.5	25.5		24.5	24.5			24.5	24.5
Effective Green, g (s)	25.5		25.5	25.5	25.5		24.5	24.5			24.5	24.5
Actuated g/C Ratio	0.42		0.42	0.42	0.42		0.41	0.41			0.41	0.41
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0		4.0	4.0			4.0	4.0
Lane Grp Cap (vph)	331		646	738	1436		240	760			720	596
v/s Ratio Prot					c0.15			c0.30			0.27	
v/s Ratio Perm	0.06		0.02	0.09			0.10					0.02
v/c Ratio	0.14		0.05	0.20	0.35		0.24	0.72			0.65	0.05
Uniform Delay, d1	10.6		10.1	10.8	11.6		11.7	14.9			14.3	10.7
Progression Factor	1.00		1.00	1.00	1.00		0.20	0.21			1.36	2.11
Incremental Delay, d2	0.9		0.1	0.6	0.7		0.3	1.8			1.8	0.0
Delay (s)	11.5		10.3	11.5	12.3		2.7	4.8			21.4	22.7
Level of Service	B		B	B	B		A	A			C	C
Approach Delay (s)		10.7			12.1			4.6			21.5	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	351	3	142	638	268	5	44	477	365	51	25
Future Volume (vph)	15	351	3	142	638	268	5	44	477	365	51	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.86		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	
Satd. Flow (prot)	1770	3535		1770	3539	1583	1770	1607		1681	1684	
Flt Permitted	0.28	1.00		0.51	1.00	1.00	0.60	1.00		0.32	0.42	
Satd. Flow (perm)	529	3535		951	3539	1583	1116	1607		575	736	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	382	3	154	693	291	5	48	518	397	55	27
RTOR Reduction (vph)	0	1	0	0	0	197	0	145	0	0	7	0
Lane Group Flow (vph)	16	384	0	154	693	94	5	421	0	238	234	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	19.8	19.8		19.4	19.4	19.4	31.0	31.0		31.0	31.0	
Effective Green, g (s)	19.8	19.8		19.4	19.4	19.4	31.0	31.0		31.0	31.0	
Actuated g/C Ratio	0.33	0.33		0.32	0.32	0.32	0.52	0.52		0.52	0.52	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	174	1166		307	1144	511	576	830		297	380	
v/s Ratio Prot		0.11			c0.20			0.26				
v/s Ratio Perm	0.03			0.16		0.06	0.00			c0.41	0.32	
v/c Ratio	0.09	0.33		0.50	0.61	0.18	0.01	0.51		0.80	0.62	
Uniform Delay, d1	13.9	15.1		16.4	17.1	14.6	7.0	9.5		12.0	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.2		1.5	1.0	0.2	0.0	2.2		20.0	7.3	
Delay (s)	14.2	15.3		17.9	18.0	14.8	7.1	11.7		31.9	17.6	
Level of Service	B	B		B	B	B	A	B		C	B	
Approach Delay (s)		15.3			17.2			11.7			24.7	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

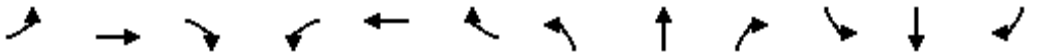
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	177	32	50	126	50	63
Future Volume (Veh/h)	177	32	50	126	50	63
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	192	35	54	137	54	68
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			227		454	210
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			227		454	210
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		90	92
cM capacity (veh/h)			1341		541	831

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	227	191	122
Volume Left	0	54	54
Volume Right	35	0	68
cSH	1700	1341	671
Volume to Capacity	0.13	0.04	0.18
Queue Length 95th (ft)	0	3	16
Control Delay (s)	0.0	2.4	11.5
Lane LOS		A	B
Approach Delay (s)	0.0	2.4	11.5
Approach LOS			B

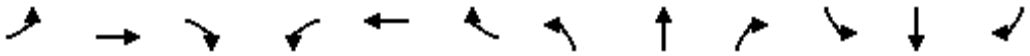
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	365	67	0	0	0	58	651	245	113	479	62
Future Volume (vph)	70	365	67	0	0	0	58	651	245	113	479	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Lane Util. Factor	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99					1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98					1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1803					1770	1863	1552	1770	1863	1515
Flt Permitted	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1803					1770	1863	1552	1770	1863	1515
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	397	73	0	0	0	63	708	266	123	521	67
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	94	0	0	40
Lane Group Flow (vph)	76	459	0	0	0	0	63	708	172	123	521	27
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	18.0	18.0					4.4	23.7	23.7	5.3	24.6	24.6
Effective Green, g (s)	18.0	18.0					4.4	23.7	23.7	5.3	24.6	24.6
Actuated g/C Ratio	0.30	0.30					0.07	0.39	0.39	0.09	0.41	0.41
Clearance Time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Vehicle Extension (s)	3.0	3.0					3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	531	540					129	735	613	156	763	621
v/s Ratio Prot	0.04	c0.25					0.04	c0.38		0.07	c0.28	
v/s Ratio Perm									0.11			0.02
v/c Ratio	0.14	0.85					0.49	0.96	0.28	0.79	0.68	0.04
Uniform Delay, d1	15.4	19.7					26.7	17.7	12.4	26.8	14.5	10.6
Progression Factor	1.00	1.00					0.95	0.85	0.58	0.74	0.53	0.72
Incremental Delay, d2	0.6	15.4					10.9	23.1	1.0	30.4	4.6	0.1
Delay (s)	15.9	35.1					36.3	38.2	8.1	50.4	12.2	7.8
Level of Service	B	D					D	D	A	D	B	A
Approach Delay (s)		32.4			0.0			30.3			18.4	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

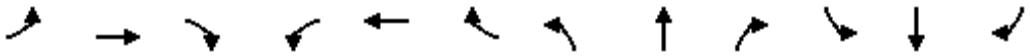
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	677	14	0	0	0	0	8	33	24	18	0
Future Volume (Veh/h)	15	677	14	0	0	0	0	8	33	24	18	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	736	15	0	0	0	0	9	36	26	20	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			751			786	776	376	440	783	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			751			786	776	376	440	783	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	94	94	100
cM capacity (veh/h)	1622			854			267	324	622	458	321	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	384	383	45	46
Volume Left	16	0	0	26
Volume Right	0	15	36	0
cSH	1622	1700	525	386
Volume to Capacity	0.01	0.23	0.09	0.12
Queue Length 95th (ft)	1	0	7	10
Control Delay (s)	0.4	0.0	12.5	15.6
Lane LOS	A		B	C
Approach Delay (s)	0.2		12.5	15.6
Approach LOS			B	C

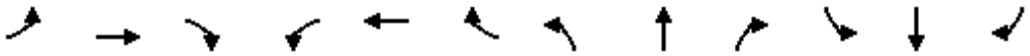
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	26	692	16	0	0	0	0	20	34	33	42	0
Future Volume (vph)	26	692	16	0	0	0	0	20	34	33	42	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	752	17	0	0	0	0	22	37	36	46	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	404	393	59	82
Volume Left (vph)	28	0	0	36
Volume Right (vph)	0	17	37	0
Hadj (s)	0.07	0.00	-0.34	0.12
Departure Headway (s)	5.0	4.9	5.2	5.6
Degree Utilization, x	0.56	0.54	0.09	0.13
Capacity (veh/h)	708	724	646	598
Control Delay (s)	12.9	12.2	8.7	9.5
Approach Delay (s)	12.5		8.7	9.5
Approach LOS	B		A	A

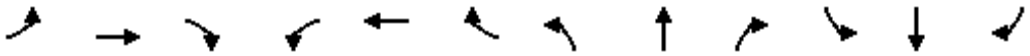
Intersection Summary				
Delay	12.0			
Level of Service	B			
Intersection Capacity Utilization	37.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	377	405	19	6	0	4	0	7	7	0	0	0
Future Volume (vph)	377	405	19	6	0	4	0	7	7	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	410	440	21	7	0	4	0	8	8	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	410	461	11	16
Volume Left (vph)	410	0	7	0
Volume Right (vph)	0	21	4	8
Hadj (s)	0.53	0.00	-0.06	-0.27
Departure Headway (s)	5.1	4.6	4.7	5.2
Degree Utilization, x	0.58	0.58	0.01	0.02
Capacity (veh/h)	704	785	753	652
Control Delay (s)	13.7	12.5	7.7	8.3
Approach Delay (s)	13.1		7.7	8.3
Approach LOS	B		A	A

Intersection Summary			
Delay	12.9		
Level of Service	B		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	37	0	0	11	16	644	16	8	589	17
Future Volume (Veh/h)	0	0	37	0	0	11	16	644	16	8	589	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	40	0	0	12	17	700	17	9	640	18
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			440	
pX, platoon unblocked	0.87	0.87	0.78	0.87	0.87	0.83	0.78			0.83		
vC, conflicting volume	1421	1432	656	1448	1432	716	665			724		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	967	980	422	998	981	556	434			565		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	97	98			99		
cM capacity (veh/h)	190	208	492	171	208	437	877			831		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	40	12	17	717	9	658
Volume Left	0	0	17	0	9	0
Volume Right	40	12	0	17	0	18
cSH	492	437	877	1700	831	1700
Volume to Capacity	0.08	0.03	0.02	0.42	0.01	0.39
Queue Length 95th (ft)	7	2	1	0	1	0
Control Delay (s)	13.0	13.5	9.2	0.0	9.4	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.0	13.5	0.2		0.1	
Approach LOS	B	B				

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	45.2%	ICU Level of Service		A
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	4	0	20	0	21	5	9	0	13	665	14	0	18	604	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	4	0	22	0	23	6	10	0	14	737	16	0	20	670	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		26			39			767			709	
Entry Volume veh/h		25			38			752			695	
Circulating Flow (Vc), pc/h	713			755			24			43		
Exiting Flow (Vex), pc/h	36			39			751			715		
Capacity (cPCE), pc/h		554			531			1103			1082	
Capacity (c), veh/h		543			521			1082			1061	
v/c Ratio (X)		0.05			0.07			0.70			0.65	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.2			7.8			14.0			12.9	
Lane LOS		A			A			B			B	
95% Queue		0.1			0.2			6.0			5.1	
Approach Delay, s/veh	7.2			7.8			14.0			12.9		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	13.2						B					

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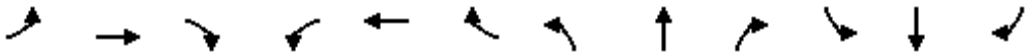
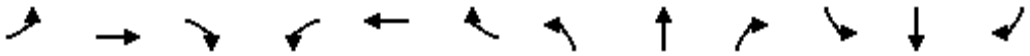


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	57	85	49	45	7	58	7	130	36	69	80	3
Future Volume (vph)	57	85	49	45	7	58	7	130	36	69	80	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	92	53	49	8	63	8	141	39	75	87	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	207	120	188	165
Volume Left (vph)	62	49	8	75
Volume Right (vph)	53	63	39	3
Hadj (s)	-0.06	-0.20	-0.08	0.11
Departure Headway (s)	4.9	4.9	4.9	5.1
Degree Utilization, x	0.28	0.16	0.26	0.23
Capacity (veh/h)	679	666	684	651
Control Delay (s)	9.8	8.9	9.5	9.7
Approach Delay (s)	9.8	8.9	9.5	9.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.5			
Level of Service	A			
Intersection Capacity Utilization	40.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	207	20	9	144	24	19	33	31	19	44	9
Future Volume (Veh/h)	8	207	20	9	144	24	19	33	31	19	44	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	225	22	10	157	26	21	36	34	21	48	10
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	197			254			486	478	243	510	476	185
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	197			254			486	478	243	510	476	185
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			95	92	96	95	90	99
cM capacity (veh/h)	1360			1303			435	471	791	412	472	847

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	256	193	91	79
Volume Left	9	10	21	21
Volume Right	22	26	34	10
cSH	1360	1303	543	481
Volume to Capacity	0.01	0.01	0.17	0.16
Queue Length 95th (ft)	0	1	15	15
Control Delay (s)	0.3	0.5	13.0	14.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.5	13.0	14.0
Approach LOS			B	B

Intersection Summary				
Average Delay	4.0			
Intersection Capacity Utilization	27.4%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	69	61	123	0	57	49	10	0	108	582	62	0	11	582	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	76	68	136	0	63	54	11	0	120	645	69	0	12	645	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		280			128			834			695	
Entry Volume veh/h		275			125			818			681	
Circulating Flow (Vc), pc/h		720			841			156			237	
Exiting Flow (Vex), pc/h		149			212			732			844	
Capacity (cPCE), pc/h		550			487			967			892	
Capacity (c), veh/h		539			478			948			874	
v/c Ratio (X)		0.51			0.26			0.86			0.78	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		15.9			11.5			26.5			20.9	
Lane LOS		C			B			D			C	
95% Queue		2.9			1.0			11.2			8.0	
Approach Delay, s/veh	15.9			11.5			26.5			20.9		
Approach LOS	C			B			D			C		
Intersection Delay, s/veh / LOS	22.0						C					

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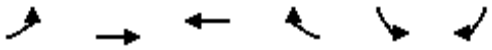
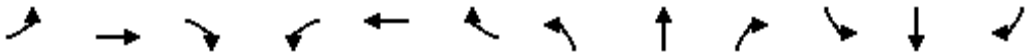


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	125	93	14	21	22
Future Volume (Veh/h)	5	125	93	14	21	22
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	136	101	15	23	24
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	124				264	118
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	124				264	118
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	97
cM capacity (veh/h)	1453				718	927

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	141	116	47
Volume Left	5	0	23
Volume Right	0	15	24
cSH	1453	1700	811
Volume to Capacity	0.00	0.07	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.3	0.0	9.7
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	9.7
Approach LOS			A

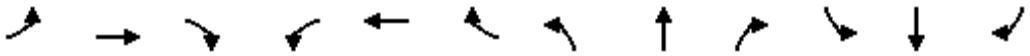
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	129	2	1	86	18	1	1	2	27	0	19
Future Volume (Veh/h)	14	129	2	1	86	18	1	1	2	27	0	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	140	2	1	93	20	1	1	2	29	0	21
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	115			142			299	288	141	280	279	107
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	115			142			299	288	141	280	279	107
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	96	100	98
cM capacity (veh/h)	1471			1441			632	614	907	662	621	944

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	157	114	4	50
Volume Left	15	1	1	29
Volume Right	2	20	2	21
cSH	1471	1441	738	757
Volume to Capacity	0.01	0.00	0.01	0.07
Queue Length 95th (ft)	1	0	0	5
Control Delay (s)	0.8	0.1	9.9	10.1
Lane LOS	A	A	A	B
Approach Delay (s)	0.8	0.1	9.9	10.1
Approach LOS			A	B

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	27.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	79	79	23	57	1	47	1	32	0	1	0
Future Volume (vph)	1	79	79	23	57	1	47	1	32	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	86	86	25	62	1	51	1	35	0	1	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	173	88	87	1
Volume Left (vph)	1	25	51	0
Volume Right (vph)	86	1	35	0
Hadj (s)	-0.26	0.08	-0.09	0.03
Departure Headway (s)	3.9	4.4	4.4	4.6
Degree Utilization, x	0.19	0.11	0.11	0.00
Capacity (veh/h)	890	802	775	723
Control Delay (s)	7.9	7.9	7.9	7.6
Approach Delay (s)	7.9	7.9	7.9	7.6
Approach LOS	A	A	A	A

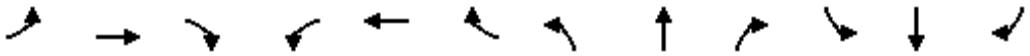
Intersection Summary				
Delay	7.9			
Level of Service	A			
Intersection Capacity Utilization	37.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	43	90	111	63	65	108
Future Volume (vph)	43	90	111	63	65	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	98	121	68	71	117

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	145	189	188
Volume Left (vph)	47	0	71
Volume Right (vph)	98	68	0
Hadj (s)	-0.31	-0.18	0.11
Departure Headway (s)	4.4	4.3	4.6
Degree Utilization, x	0.18	0.22	0.24
Capacity (veh/h)	747	805	753
Control Delay (s)	8.4	8.5	9.0
Approach Delay (s)	8.4	8.5	9.0
Approach LOS	A	A	A

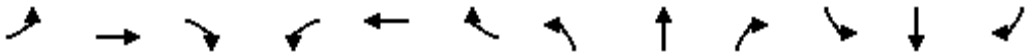
Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	201	18	19	166	42	25	31	37	46	19	12
Future Volume (Veh/h)	8	201	18	19	166	42	25	31	37	46	19	12
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	218	20	21	180	46	27	34	40	50	21	13
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.92						0.92	0.92		0.92	0.92	0.92
vC, conflicting volume	229			249			530	528	247	559	515	210
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	117			249			444	442	247	476	428	96
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			94	92	95	87	95	99
cM capacity (veh/h)	1349			1305			441	452	779	396	461	877

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	247	247	101	84
Volume Left	9	21	27	50
Volume Right	20	46	40	13
cSH	1349	1305	538	450
Volume to Capacity	0.01	0.02	0.19	0.19
Queue Length 95th (ft)	1	1	17	17
Control Delay (s)	0.3	0.8	13.2	14.8
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	13.2	14.8
Approach LOS			B	B

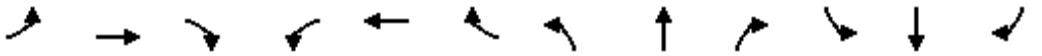
Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	35.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	160	60	263	155	235	63	618	169	242	525	21
Future Volume (vph)	40	160	60	263	155	235	63	618	169	242	525	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	0.93	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844	1532	1681	1746	1478	1770	3412		1770	1847	
Flt Permitted		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1844	1532	1681	1746	1478	1770	3412		1770	1847	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	174	65	286	168	255	68	672	184	263	571	23
RTOR Reduction (vph)	0	0	55	0	0	210	0	27	0	0	2	0
Lane Group Flow (vph)	0	217	10	223	231	45	68	829	0	263	592	0
Confl. Peds. (#/hr)	14		10	10		14			3			15
Confl. Bikes (#/hr)			4			5			3			3
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		14.4	14.4	15.9	15.9	15.9	5.8	25.2		15.7	35.1	
Effective Green, g (s)		14.4	14.4	15.9	15.9	15.9	5.8	25.2		15.7	35.1	
Actuated g/C Ratio		0.16	0.16	0.18	0.18	0.18	0.06	0.28		0.17	0.39	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.5		2.0	3.5	
Lane Grp Cap (vph)		295	245	296	308	261	114	955		308	720	
v/s Ratio Prot		c0.12		c0.13	0.13		0.04	0.24		c0.15	c0.32	
v/s Ratio Perm			0.01			0.03						
v/c Ratio		0.74	0.04	0.75	0.75	0.17	0.60	0.87		0.85	0.82	
Uniform Delay, d1		36.0	32.0	35.2	35.2	31.5	41.0	30.8		36.0	24.7	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.0	0.0	10.7	10.1	0.4	5.5	10.6		19.3	10.3	
Delay (s)		43.9	32.0	45.9	45.3	31.8	46.4	41.4		55.3	34.9	
Level of Service		D	C	D	D	C	D	D		E	C	
Approach Delay (s)		41.2			40.6			41.8			41.2	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		

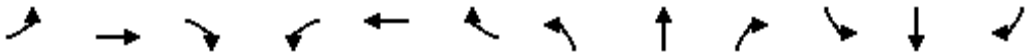
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	513	6	22	570	63	9	10	57	118	8	30
Future Volume (vph)	15	513	6	22	570	63	9	10	57	118	8	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3531		1764	3482			3091			1779	1544
Flt Permitted	0.39	1.00		0.44	1.00			0.90			0.73	1.00
Satd. Flow (perm)	727	3531		817	3482			2802			1359	1544
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	558	7	24	620	68	10	11	62	128	9	33
RTOR Reduction (vph)	0	2	0	0	13	0	0	50	0	0	0	27
Lane Group Flow (vph)	16	563	0	24	675	0	0	33	0	0	137	6
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	13.1	13.1		13.1	13.1			5.3			5.3	5.3
Effective Green, g (s)	13.1	13.1		13.1	13.1			5.3			5.3	5.3
Actuated g/C Ratio	0.47	0.47		0.47	0.47			0.19			0.19	0.19
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	341	1657		383	1634			532			258	293
v/s Ratio Prot		0.16			c0.19							
v/s Ratio Perm	0.02			0.03				0.01			c0.10	0.00
v/c Ratio	0.05	0.34		0.06	0.41			0.06			0.53	0.02
Uniform Delay, d1	4.0	4.7		4.0	4.9			9.3			10.2	9.2
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.1	0.1		0.1	0.2			0.1			2.7	0.0
Delay (s)	4.1	4.8		4.1	5.0			9.3			12.8	9.2
Level of Service	A	A		A	A			A			B	A
Approach Delay (s)		4.8			5.0			9.3			12.1	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	5.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	27.9	Sum of lost time (s)	9.5
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

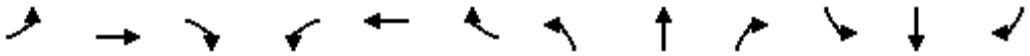
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	10	12	24	10	80	16	653	44	102	680	15
Future Volume (vph)	33	10	12	24	10	80	16	653	44	102	680	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1743			1797	1555	1770	3500		1770	3526	
Flt Permitted		0.79			0.75	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1427			1401	1555	1770	3500		1770	3526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	11	13	26	11	87	17	710	48	111	739	16
RTOR Reduction (vph)	0	11	0	0	0	76	0	6	0	0	2	0
Lane Group Flow (vph)	0	49	0	0	37	11	17	752	0	111	753	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		5.5			5.5	5.5	0.6	18.6		6.4	24.4	
Effective Green, g (s)		5.5			5.5	5.5	0.6	18.6		6.4	24.4	
Actuated g/C Ratio		0.12			0.12	0.12	0.01	0.42		0.14	0.55	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		177			174	193	24	1472		256	1946	
v/s Ratio Prot							0.01	c0.21		c0.06	0.21	
v/s Ratio Perm		c0.03			0.03	0.01						
v/c Ratio		0.27			0.21	0.06	0.71	0.51		0.43	0.39	
Uniform Delay, d1		17.5			17.4	17.1	21.7	9.4		17.2	5.6	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.2	0.0	65.6	0.3		1.2	0.1	
Delay (s)		17.8			17.6	17.1	87.3	9.7		18.4	5.8	
Level of Service		B			B	B	F	A		B	A	
Approach Delay (s)		17.8			17.3			11.4			7.4	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	44.2	Sum of lost time (s)	13.7
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

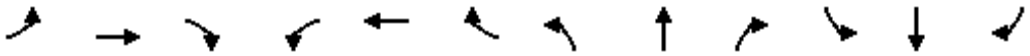
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	135	10	11	82	0	22	0	19	0	0	0
Future Volume (Veh/h)	2	135	10	11	82	0	22	0	19	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	147	11	12	89	0	24	0	21	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	89			158			270	270	152	290	275	89
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			158			270	270	152	290	275	89
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			96	100	98	100	100	100
cM capacity (veh/h)	1506			1422			678	631	894	641	626	969

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	160	101	45	0
Volume Left	2	12	24	0
Volume Right	11	0	21	0
cSH	1506	1422	764	1700
Volume to Capacity	0.00	0.01	0.06	0.00
Queue Length 95th (ft)	0	1	5	0
Control Delay (s)	0.1	1.0	10.0	0.0
Lane LOS	A	A	B	A
Approach Delay (s)	0.1	1.0	10.0	0.0
Approach LOS			B	A

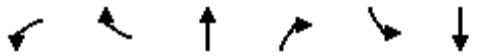
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	21.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	75	16	0	29	0	16	1	5	0	0	0
Future Volume (Veh/h)	0	75	16	0	29	0	16	1	5	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	82	17	0	32	0	17	1	5	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	32			99			122	122	90	128	131	32
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	32			99			122	122	90	128	131	32
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	100	99	100	100	100
cM capacity (veh/h)	1580			1494			852	768	967	840	760	1042

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	99	32	23	0
Volume Left	0	0	17	0
Volume Right	17	0	5	0
cSH	1580	1494	871	1700
Volume to Capacity	0.00	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	2	0
Control Delay (s)	0.0	0.0	9.2	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.2	0.0
Approach LOS			A	A

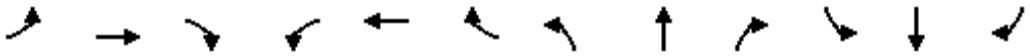
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	14.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	37	154	11	21	184	11
Future Volume (vph)	37	154	11	21	184	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	167	12	23	200	12

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	207	35	212
Volume Left (vph)	40	0	200
Volume Right (vph)	167	23	0
Hadj (s)	-0.41	-0.36	0.22
Departure Headway (s)	4.1	4.2	4.6
Degree Utilization, x	0.23	0.04	0.27
Capacity (veh/h)	830	791	742
Control Delay (s)	8.3	7.4	9.3
Approach Delay (s)	8.3	7.4	9.3
Approach LOS	A	A	A

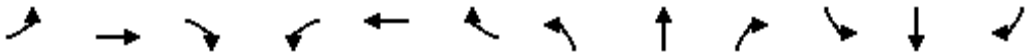
Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	203	61	9	159	10	83	11	12	3	8	15
Future Volume (Veh/h)	6	203	61	9	159	10	83	11	12	3	8	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	221	66	10	173	11	90	12	13	3	9	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	184			287			487	472	254	486	500	178
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	184			287			487	472	254	486	500	178
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			81	98	98	99	98	98
cM capacity (veh/h)	1391			1275			470	484	785	470	467	864

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	294	194	115	28
Volume Left	7	10	90	3
Volume Right	66	11	13	16
cSH	1391	1275	494	634
Volume to Capacity	0.01	0.01	0.23	0.04
Queue Length 95th (ft)	0	1	22	3
Control Delay (s)	0.2	0.5	14.5	10.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.5	14.5	10.9
Approach LOS			B	B

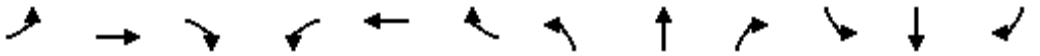
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	35.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	208	5	15	173	26	3	7	14	12	3	3
Future Volume (Veh/h)	3	208	5	15	173	26	3	7	14	12	3	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	226	5	16	188	28	3	8	15	13	3	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	216			231			473	482	228	488	471	202
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	216			231			473	482	228	488	471	202
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	98	98	97	99	100
cM capacity (veh/h)	1354			1337			492	477	811	470	484	839

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	234	232	26	19
Volume Left	3	16	3	13
Volume Right	5	28	15	3
cSH	1354	1337	628	508
Volume to Capacity	0.00	0.01	0.04	0.04
Queue Length 95th (ft)	0	1	3	3
Control Delay (s)	0.1	0.6	11.0	12.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.6	11.0	12.4
Approach LOS			B	B

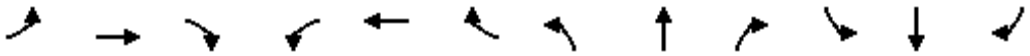
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	30.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	118	106	51	68	23	117	696	74	92	552	41
Future Volume (vph)	53	118	106	51	68	23	117	696	74	92	552	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.95			0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750			1790		1770	3488		1770	3502	
Flt Permitted		0.91			0.78		0.95	1.00		0.34	1.00	
Satd. Flow (perm)		1605			1422		1770	3488		627	3502	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	128	115	55	74	25	127	757	80	100	600	45
RTOR Reduction (vph)	0	28	0	0	9	0	0	12	0	0	7	0
Lane Group Flow (vph)	0	273	0	0	145	0	127	825	0	100	638	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		14.4			14.0		7.0	28.2		17.0	17.0	
Effective Green, g (s)		14.4			14.0		7.0	28.2		17.0	17.0	
Actuated g/C Ratio		0.28			0.27		0.13	0.54		0.33	0.33	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		442			381		237	1884		204	1140	
v/s Ratio Prot							0.07	c0.24			c0.18	
v/s Ratio Perm		c0.17			0.10					0.16		
v/c Ratio		0.62			0.38		0.54	0.44		0.49	0.56	
Uniform Delay, d1		16.5			15.6		21.1	7.2		14.1	14.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.6			0.8		1.2	0.2		1.9	0.6	
Delay (s)		19.1			16.3		22.3	7.4		16.0	15.1	
Level of Service		B			B		C	A		B	B	
Approach Delay (s)		19.1			16.3			9.3			15.2	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	52.2	Sum of lost time (s)	14.2
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

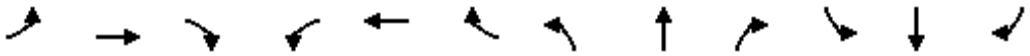
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	260	13	13	117	5	15	18	6	8	7	9
Future Volume (Veh/h)	9	260	13	13	117	5	15	18	6	8	7	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	283	14	14	127	5	16	20	7	9	8	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked				0.99			0.99	0.99	0.99	0.99	0.99	
vC, conflicting volume	132			297			482	470	290	484	474	130
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	132			289			475	463	282	478	468	130
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	96	99	98	98	99
cM capacity (veh/h)	1453			1264			479	484	752	468	481	920

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	307	146	43	27
Volume Left	10	14	16	9
Volume Right	14	5	7	10
cSH	1453	1264	511	578
Volume to Capacity	0.01	0.01	0.08	0.05
Queue Length 95th (ft)	1	1	7	4
Control Delay (s)	0.3	0.8	12.7	11.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	12.7	11.5
Approach LOS			B	B

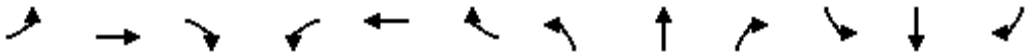
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	26.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	251	9	11	119	3	12	23	11	4	10	6
Future Volume (vph)	9	251	9	11	119	3	12	23	11	4	10	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	273	10	12	129	3	13	25	12	4	11	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	293	144	50	22
Volume Left (vph)	10	12	13	4
Volume Right (vph)	10	3	12	7
Hadj (s)	0.02	0.04	-0.06	-0.12
Departure Headway (s)	4.3	4.4	4.8	4.8
Degree Utilization, x	0.35	0.18	0.07	0.03
Capacity (veh/h)	828	781	677	670
Control Delay (s)	9.5	8.4	8.2	8.0
Approach Delay (s)	9.5	8.4	8.2	8.0
Approach LOS	A	A	A	A

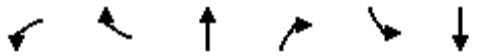
Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	26.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	267	16	68	115	33	16	80	154	63	17	4
Future Volume (vph)	17	267	16	68	115	33	16	80	154	63	17	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	290	17	74	125	36	17	87	167	68	18	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	325	235	271	90
Volume Left (vph)	18	74	17	68
Volume Right (vph)	17	36	167	4
Hadj (s)	0.01	0.01	-0.32	0.16
Departure Headway (s)	5.3	5.5	5.3	6.1
Degree Utilization, x	0.48	0.36	0.40	0.15
Capacity (veh/h)	634	610	622	509
Control Delay (s)	13.2	11.5	11.7	10.2
Approach Delay (s)	13.2	11.5	11.7	10.2
Approach LOS	B	B	B	B

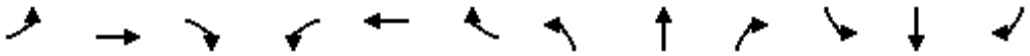
Intersection Summary				
Delay	12.0			
Level of Service	B			
Intersection Capacity Utilization	60.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	5	57	58	4	41	22
Future Volume (vph)	5	57	58	4	41	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	62	63	4	45	24

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	67	67	69
Volume Left (vph)	5	0	45
Volume Right (vph)	62	4	0
Hadj (s)	-0.51	0.00	0.16
Departure Headway (s)	3.7	4.1	4.3
Degree Utilization, x	0.07	0.08	0.08
Capacity (veh/h)	938	851	826
Control Delay (s)	7.0	7.4	7.6
Approach Delay (s)	7.0	7.4	7.6
Approach LOS	A	A	A

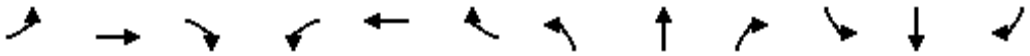
Intersection Summary			
Delay	7.3		
Level of Service	A		
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	103	33	203	82	350	37	569	269	293	478	18
Future Volume (vph)	15	103	33	203	82	350	37	569	269	293	478	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1553		1799	1583	1770	3331		1770	3514	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1553		1799	1583	1770	3331		1770	3514	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	112	36	221	89	380	40	618	292	318	520	20
RTOR Reduction (vph)	0	0	33	0	0	313	0	57	0	0	2	0
Lane Group Flow (vph)	16	112	3	0	310	67	40	853	0	318	538	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	Over	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	6.6	6.6	6.6		17.3	14.0	3.2	22.4		14.0	33.2	
Effective Green, g (s)	6.6	6.6	6.6		17.3	14.0	3.2	22.4		14.0	33.2	
Actuated g/C Ratio	0.08	0.08	0.08		0.22	0.18	0.04	0.28		0.18	0.42	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	147	154	129		391	279	71	939		312	1469	
v/s Ratio Prot	0.01	c0.06			c0.17	0.04	0.02	c0.26		c0.18	0.15	
v/s Ratio Perm			0.00									
v/c Ratio	0.11	0.73	0.02		0.79	0.24	0.56	0.91		1.02	0.37	
Uniform Delay, d1	33.7	35.5	33.4		29.4	28.1	37.4	27.5		32.7	15.9	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	13.5	0.0		10.5	0.2	6.0	12.3		55.9	0.2	
Delay (s)	33.8	49.0	33.5		39.9	28.3	43.4	39.8		88.6	16.0	
Level of Service	C	D	C		D	C	D	D		F	B	
Approach Delay (s)		44.1			33.5			39.9			42.9	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	79.4	Sum of lost time (s)	19.1
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

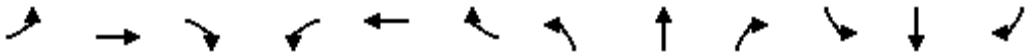
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	618	6	8	594	28	4	0	8	13	3	30
Future Volume (Veh/h)	5	618	6	8	594	28	4	0	8	13	3	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	672	7	9	646	30	4	0	9	14	3	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	676			679			1399	1380	676	1374	1368	661
vC1, stage 1 conf vol							686	686		679	679	
vC2, stage 2 conf vol							714	694		694	689	
vCu, unblocked vol	676			637			1394	1373	634	1367	1361	661
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	100	98	96	99	93
cM capacity (veh/h)	915			901			297	330	456	314	331	462

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	684	685	13	50
Volume Left	5	9	4	14
Volume Right	7	30	9	33
cSH	915	901	392	400
Volume to Capacity	0.01	0.01	0.03	0.13
Queue Length 95th (ft)	0	1	3	11
Control Delay (s)	0.1	0.3	14.5	15.3
Lane LOS	A	A	B	C
Approach Delay (s)	0.1	0.3	14.5	15.3
Approach LOS			B	C

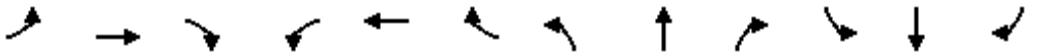
Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	48.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	730	5	12	718	33	1	1	19	13	1	8
Future Volume (Veh/h)	5	730	5	12	718	33	1	1	19	13	1	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	793	5	13	780	36	1	1	21	14	1	9
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.99			0.99	0.99	0.99	0.99	0.99	
vC, conflicting volume	816			799			1641	1648	796	1651	1633	799
vC1, stage 1 conf vol							806	806		824	824	
vC2, stage 2 conf vol							834	842		827	809	
vCu, unblocked vol	816			793			1642	1650	790	1652	1634	799
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			100	100	95	94	100	98
cM capacity (veh/h)	812			820			256	278	386	247	278	385

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	803	829	23	24
Volume Left	5	13	1	14
Volume Right	5	36	21	9
cSH	812	820	372	287
Volume to Capacity	0.01	0.02	0.06	0.08
Queue Length 95th (ft)	0	1	5	7
Control Delay (s)	0.2	0.4	15.3	18.7
Lane LOS	A	A	C	C
Approach Delay (s)	0.2	0.4	15.3	18.7
Approach LOS			C	C

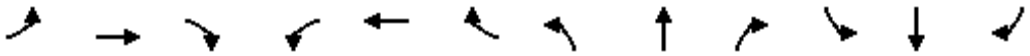
Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	722	0	9	743	205	0	0	5	3	0	11
Future Volume (Veh/h)	8	722	0	9	743	205	0	0	5	3	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	785	0	10	808	223	0	0	5	3	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1031			785			1643	1854	785	1748	1742	920
vC1, stage 1 conf vol							803	803		940	940	
vC2, stage 2 conf vol							840	1051		808	803	
vCu, unblocked vol	1031			785			1643	1854	785	1748	1742	920
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	99	99	100	96
cM capacity (veh/h)	674			834			253	237	393	237	260	329

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	794	10	1031	5	15
Volume Left	9	10	0	0	3
Volume Right	0	0	223	5	12
cSH	674	834	1700	393	305
Volume to Capacity	0.01	0.01	0.61	0.01	0.05
Queue Length 95th (ft)	1	1	0	1	4
Control Delay (s)	0.4	9.4	0.0	14.3	17.4
Lane LOS	A	A		B	C
Approach Delay (s)	0.4	0.1		14.3	17.4
Approach LOS				B	C

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	41	5	0	13	43	721	4	18	578	4
Future Volume (Veh/h)	0	0	41	5	0	13	43	721	4	18	578	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	45	5	0	14	47	784	4	20	628	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1170	1552	630	1593	1552	394	632			788		
vC1, stage 1 conf vol	670	670		880	880							
vC2, stage 2 conf vol	500	882		713	672							
vCu, unblocked vol	1170	1552	630	1593	1552	394	632			788		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	89	98	100	98	95			98		
cM capacity (veh/h)	324	273	424	210	273	605	947			827		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	45	19	47	523	265	20	632
Volume Left	0	5	47	0	0	20	0
Volume Right	45	14	0	0	4	0	4
cSH	424	405	947	1700	1700	827	1700
Volume to Capacity	0.11	0.05	0.05	0.31	0.16	0.02	0.37
Queue Length 95th (ft)	9	4	4	0	0	2	0
Control Delay (s)	14.5	14.3	9.0	0.0	0.0	9.5	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	14.5	14.3	0.5			0.3	
Approach LOS	B	B					

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	122	53	50	0	33	7	16	0	16	690	28	0	12	690	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	135	59	55	0	37	8	18	0	18	765	31	0	13	765	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		249			63			814			811	
Entry Volume veh/h		244			62			798			795	
Circulating Flow (Vc), pc/h	815			918			207			63		
Exiting Flow (Vex), pc/h	103			59			918			857		
Capacity (cPCE), pc/h		500			451			919			1061	
Capacity (c), veh/h		490			442			901			1040	
v/c Ratio (X)		0.50			0.14			0.89			0.76	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		16.9			10.2			30.2			17.5	
Lane LOS		C			B			D			C	
95% Queue		2.7			0.5			12.0			7.8	
Approach Delay, s/veh	16.9			10.2			30.2			17.5		
Approach LOS	C			B			D			C		
Intersection Delay, s/veh / LOS	22.5						C					

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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	582	209	627	667	0	0
Future Volume (veh/h)	582	209	627	667	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863		
Adj Flow Rate, veh/h	633	227	682	725		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1593	712	1205	3185		
Arrive On Green	0.45	0.45	0.35	0.90		
Sat Flow, veh/h	3632	1583	3442	3632		
Grp Volume(v), veh/h	633	227	682	725		
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770		
Q Serve(g_s), s	4.8	3.7	6.4	1.0		
Cycle Q Clear(g_c), s	4.8	3.7	6.4	1.0		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1593	712	1205	3185		
V/C Ratio(X)	0.40	0.32	0.57	0.23		
Avail Cap(c_a), veh/h	1593	712	1205	3185		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	7.4	7.1	10.5	0.3		
Incr Delay (d2), s/veh	0.7	1.2	1.9	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.5	1.8	3.4	0.5		
LnGrp Delay(d),s/veh	8.1	8.2	12.5	0.4		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	860			1407		
Approach Delay, s/veh	8.1			6.3		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			18.0	22.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			14.0	18.0				36.0
Max Q Clear Time (g_c+I1), s			8.4	6.8				3.0
Green Ext Time (p_c), s			1.4	3.9				5.8

Intersection Summary	
HCM 2010 Ctrl Delay	7.0
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1267	114	370	964	183	0
Future Volume (veh/h)	1267	114	370	964	183	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	1377	124	402	1048	199	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1416	633	459	2124	473	422
Arrive On Green	0.40	0.40	0.13	0.60	0.27	0.00
Sat Flow, veh/h	3632	1583	3442	3632	1774	1583
Grp Volume(v), veh/h	1377	124	402	1048	199	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770	1774	1583
Q Serve(g_s), s	22.9	3.1	6.9	10.1	5.6	0.0
Cycle Q Clear(g_c), s	22.9	3.1	6.9	10.1	5.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1416	633	459	2124	473	422
V/C Ratio(X)	0.97	0.20	0.88	0.49	0.42	0.00
Avail Cap(c_a), veh/h	1416	633	459	2124	473	422
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.7	11.7	25.5	6.8	18.2	0.0
Incr Delay (d2), s/veh	18.2	0.7	20.3	0.8	2.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.7	1.4	4.5	5.0	3.1	0.0
LnGrp Delay(d),s/veh	35.9	12.4	45.8	7.6	20.9	0.0
LnGrp LOS	D	B	D	A	C	
Approach Vol, veh/h	1501			1450	199	
Approach Delay, s/veh	34.0			18.2	20.9	
Approach LOS	C			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	12.0	28.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	8.0	24.0				36.0
Max Q Clear Time (g_c+I1), s		7.6	8.9	24.9				12.1
Green Ext Time (p_c), s		0.3	0.0	0.0				8.4

Intersection Summary	
HCM 2010 Ctrl Delay	25.9
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
51: Pirates Cove Way/I-5 SB Off-Ramp & Mission Ave

02/08/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1094	10	163	1017	450	8	0	62	323	18	125
Future Volume (veh/h)	0	1094	10	163	1017	450	8	0	62	323	18	125
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	1863	1863	0	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	1189	11	177	1105	0	9	0	67	365	0	136
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1670	15	250	2343	1048	0	0	0	800	0	357
Arrive On Green	0.00	0.46	0.46	0.14	0.66	0.00	0.00	0.00	0.00	0.23	0.00	0.23
Sat Flow, veh/h	0	3686	33	1774	3539	1583		0		3548	0	1583
Grp Volume(v), veh/h	0	586	614	177	1105	0		0.0		365	0	136
Grp Sat Flow(s),veh/h/ln	0	1770	1857	1774	1770	1583				1774	0	1583
Q Serve(g_s), s	0.0	18.8	18.8	6.8	10.9	0.0				6.3	0.0	5.2
Cycle Q Clear(g_c), s	0.0	18.8	18.8	6.8	10.9	0.0				6.3	0.0	5.2
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	822	863	250	2343	1048				800	0	357
V/C Ratio(X)	0.00	0.71	0.71	0.71	0.47	0.00				0.46	0.00	0.38
Avail Cap(c_a), veh/h	0	822	863	250	2343	1048				800	0	357
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	15.2	15.2	29.1	5.9	0.0				23.7	0.0	23.3
Incr Delay (d2), s/veh	0.0	5.2	5.0	15.6	0.7	0.0				1.9	0.0	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	10.3	10.7	4.4	5.4	0.0				3.3	0.0	2.6
LnGrp Delay(d),s/veh	0.0	20.4	20.2	44.7	6.6	0.0				25.6	0.0	26.4
LnGrp LOS		C	C	D	A					C		C
Approach Vol, veh/h		1200			1282						501	
Approach Delay, s/veh		20.3			11.9						25.8	
Approach LOS		C			B						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			14.0	37.0		20.0		51.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			10.0	33.0		16.0		47.0
Max Q Clear Time (g_c+I1), s			8.8	20.8		8.3		12.9
Green Ext Time (p_c), s			0.1	6.3		1.2		10.1

Intersection Summary	
HCM 2010 Ctrl Delay	17.6
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	252	584	23	69	857	426	21	7	37	417	19	103
Future Volume (veh/h)	252	584	23	69	857	426	21	7	37	417	19	103
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	274	635	25	75	932	463	23	8	40	293	245	112
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	296	1157	46	177	944	721	267	93	317	335	229	105
Arrive On Green	0.17	0.33	0.33	0.13	0.35	0.35	0.20	0.20	0.20	0.19	0.19	0.19
Sat Flow, veh/h	1774	3472	137	1774	3539	1583	1333	464	1583	1774	1211	554
Grp Volume(v), veh/h	274	323	337	75	932	463	31	0	40	293	0	357
Grp Sat Flow(s),veh/h/ln	1774	1770	1839	1774	1770	1583	1796	0	1583	1774	0	1765
Q Serve(g_s), s	13.7	13.4	13.4	3.5	23.5	20.6	1.3	0.0	1.9	14.4	0.0	17.0
Cycle Q Clear(g_c), s	13.7	13.4	13.4	3.5	23.5	20.6	1.3	0.0	1.9	14.4	0.0	17.0
Prop In Lane	1.00		0.07	1.00		1.00	0.74		1.00	1.00		0.31
Lane Grp Cap(c), veh/h	296	590	613	177	944	721	359	0	317	335	0	333
V/C Ratio(X)	0.93	0.55	0.55	0.42	0.99	0.64	0.09	0.00	0.13	0.87	0.00	1.07
Avail Cap(c_a), veh/h	296	590	613	177	944	721	359	0	317	335	0	333
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	37.0	24.5	24.5	36.6	28.9	16.7	29.3	0.0	29.5	35.5	0.0	36.5
Incr Delay (d2), s/veh	36.5	3.6	3.5	7.2	26.4	4.4	0.5	0.0	0.8	25.7	0.0	69.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.7	7.2	7.4	2.1	14.8	12.3	0.7	0.0	0.9	9.5	0.0	14.7
LnGrp Delay(d),s/veh	73.5	28.1	28.0	43.9	55.3	21.0	29.8	0.0	30.4	61.2	0.0	105.9
LnGrp LOS	E	C	C	D	E	C	C		C	E		F
Approach Vol, veh/h		934			1470			71			650	
Approach Delay, s/veh		41.4			43.9			30.1			85.7	
Approach LOS		D			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.0	13.0	34.0		21.0	19.0	28.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	9.0	30.0		17.0	15.0	24.0
Max Q Clear Time (g_c+I1), s		3.9	5.5	15.4		19.0	15.7	25.5
Green Ext Time (p_c), s		0.2	0.0	3.5		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	51.6
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	834	139	45	735	259	177	56	72	612	136	449
Future Volume (veh/h)	70	834	139	45	735	259	177	56	72	612	136	449
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	76	907	151	49	799	282	126	153	78	771	0	488
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	118	945	157	79	1022	457	335	352	299	986	0	440
Arrive On Green	0.09	0.41	0.41	0.04	0.29	0.29	0.19	0.19	0.19	0.28	0.00	0.28
Sat Flow, veh/h	1774	3038	506	1774	3539	1583	1774	1863	1583	3548	0	1583
Grp Volume(v), veh/h	76	528	530	49	799	282	126	153	78	771	0	488
Grp Sat Flow(s),veh/h/ln	1774	1770	1774	1774	1770	1583	1774	1863	1583	1774	0	1583
Q Serve(g_s), s	3.7	26.1	26.1	2.4	18.7	13.9	5.6	6.5	3.8	18.0	0.0	25.0
Cycle Q Clear(g_c), s	3.7	26.1	26.1	2.4	18.7	13.9	5.6	6.5	3.8	18.0	0.0	25.0
Prop In Lane	1.00		0.29	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	118	551	552	79	1022	457	335	352	299	986	0	440
V/C Ratio(X)	0.64	0.96	0.96	0.62	0.78	0.62	0.38	0.43	0.26	0.78	0.00	1.11
Avail Cap(c_a), veh/h	118	551	552	79	1022	457	335	352	299	986	0	440
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.0	25.8	25.8	42.3	29.4	27.7	31.9	32.3	31.1	30.0	0.0	32.5
Incr Delay (d2), s/veh	23.8	29.6	29.6	31.6	5.9	6.1	3.2	3.9	2.1	6.2	0.0	76.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	17.1	17.2	1.9	9.9	6.8	3.0	3.7	1.8	9.6	0.0	20.2
LnGrp Delay(d),s/veh	63.8	55.4	55.4	73.9	35.3	33.8	35.1	36.1	33.2	36.2	0.0	108.6
LnGrp LOS	E	E	E	E	D	C	D	D	C	D		F
Approach Vol, veh/h		1134			1130			357			1259	
Approach Delay, s/veh		56.0			36.6			35.1			64.3	
Approach LOS		E			D			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	8.0	32.0		29.0	10.0	30.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	28.0		25.0	6.0	26.0
Max Q Clear Time (g_c+I1), s		8.5	4.4	28.1		27.0	5.7	20.7
Green Ext Time (p_c), s		1.0	0.0	0.0		0.0	0.0	2.9

Intersection Summary	
HCM 2010 Ctrl Delay	51.1
HCM 2010 LOS	D

Notes

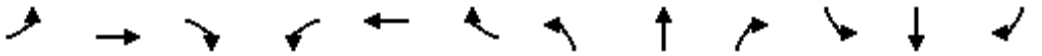
Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	85	12	27	93	39	7	86	32	0	0	0
Future Vol, veh/h	40	85	12	27	93	39	7	86	32	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	92	13	29	101	42	8	93	35	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.5	8.4	8.5
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	6%	29%	17%
Vol Thru, %	69%	62%	58%
Vol Right, %	26%	9%	25%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	125	137	159
LT Vol	7	40	27
Through Vol	86	85	93
RT Vol	32	12	39
Lane Flow Rate	136	149	173
Geometry Grp	1	1	1
Degree of Util (X)	0.17	0.184	0.207
Departure Headway (Hd)	4.505	4.444	4.304
Convergence, Y/N	Yes	Yes	Yes
Cap	798	809	835
Service Time	2.529	2.463	2.322
HCM Lane V/C Ratio	0.17	0.184	0.207
HCM Control Delay	8.5	8.5	8.4
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.6	0.7	0.8

Appendix H – Analysis Output Sheets (Existing with Project Alternative 3)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	78	51	71	290	486	142	14	107	71	18	66
Future Volume (vph)	85	78	51	71	290	486	142	14	107	71	18	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3158	1441		1782	1583		1792	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3158	1441		1782	1583		1792	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	85	55	77	315	528	154	15	116	77	20	72
RTOR Reduction (vph)	0	0	47	0	181	218	0	0	81	0	0	56
Lane Group Flow (vph)	92	85	8	77	398	46	0	169	35	0	97	16
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	7.2	11.0	11.0	6.6	14.0	14.0		24.6	24.6		17.6	17.6
Effective Green, g (s)	7.2	11.0	11.0	6.6	14.0	14.0		24.6	24.6		17.6	17.6
Actuated g/C Ratio	0.09	0.14	0.14	0.08	0.17	0.17		0.31	0.31		0.22	0.22
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	158	254	216	144	548	250		543	483		391	345
v/s Ratio Prot	c0.05	0.05		0.04	c0.13			c0.09			c0.05	
v/s Ratio Perm			0.00			0.03			0.02			0.01
v/c Ratio	0.58	0.33	0.03	0.53	0.73	0.18		0.31	0.07		0.25	0.05
Uniform Delay, d1	35.3	31.5	30.2	35.5	31.5	28.4		21.5	19.9		26.0	24.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	5.4	0.3	0.0	3.8	4.1	0.1		1.5	0.3		1.5	0.2
Delay (s)	40.6	31.8	30.2	39.3	35.5	28.6		23.0	20.2		27.5	25.1
Level of Service	D	C	C	D	D	C		C	C		C	C
Approach Delay (s)		34.9			33.8			21.9			26.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	80.6	Sum of lost time (s)	20.8
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	07/22/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	2	0	325	0	239	0	1	113	369	0	76	105	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	2	0	360	0	260	0	1	125	409	0	84	116	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		2		0	360	260		126	409	84	116	
Entry Volume veh/h		2		0	353	260		124	401	82	114	
Circulating Flow (Vc), pc/h	560			126			84			361		
Exiting Flow (Vex), pc/h	84			1			125			478		
Capacity (cPCE), pc/h		645		1028	1035			1065		862	878	
Capacity (c), veh/h		633		1008	1014			1045		845	860	
v/c Ratio (X)		0.00		0.00	0.35			0.12		0.10	0.13	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.7		3.6	7.2	0.0		4.5	0.0	5.2	5.5	
Lane LOS		A		A	A	A		A	A	A	A	
95% Queue		0.0		0.0	1.6			0.4		0.3	0.5	
Approach Delay, s/veh	5.7			4.1			1.1			5.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	3.1						A					

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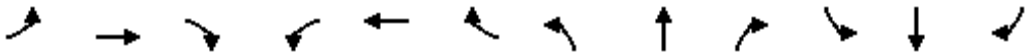
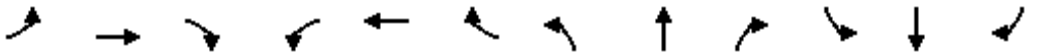


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	4	39	9	29	50	53	28	43	42	79	59	12
Future Volume (vph)	4	39	9	29	50	53	28	43	42	79	59	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	42	10	32	54	58	30	47	46	86	64	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	56	144	123	163
Volume Left (vph)	4	32	30	86
Volume Right (vph)	10	58	46	13
Hadj (s)	-0.06	-0.16	-0.14	0.09
Departure Headway (s)	4.7	4.5	4.4	4.6
Degree Utilization, x	0.07	0.18	0.15	0.21
Capacity (veh/h)	704	748	767	738
Control Delay (s)	8.1	8.5	8.2	8.8
Approach Delay (s)	8.1	8.5	8.2	8.8
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	35.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	11	31	6	21	43	29	218	13	17	299	64
Future Volume (vph)	112	11	31	6	21	43	29	218	13	17	299	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	2.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1782	1583		1702		1770	1847		1770	1863	1583
Flt Permitted		0.82	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1518	1583		1679		1770	1847		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	122	12	34	7	23	47	32	237	14	18	325	70
RTOR Reduction (vph)	0	0	26	0	36	0	0	3	0	0	0	30
Lane Group Flow (vph)	0	134	8	0	41	0	32	248	0	18	325	40
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		11.0	11.0		11.0		3.2	12.9		11.7	26.2	26.2
Effective Green, g (s)		11.0	11.0		11.0		3.2	12.9		11.7	26.2	26.2
Actuated g/C Ratio		0.24	0.24		0.24		0.07	0.28		0.25	0.56	0.56
Clearance Time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	2.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		3.0	7.0	7.0
Lane Grp Cap (vph)		359	375		398		122	513		446	1051	893
v/s Ratio Prot							c0.02	c0.13		0.01	c0.17	
v/s Ratio Perm		c0.09	0.01		0.02							0.02
v/c Ratio		0.37	0.02		0.10		0.26	0.48		0.04	0.31	0.04
Uniform Delay, d1		14.8	13.6		13.8		20.5	14.0		13.1	5.3	4.5
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		2.3	0.1		0.4		1.2	0.7		0.0	0.6	0.1
Delay (s)		17.1	13.7		14.2		21.6	14.7		13.1	5.9	4.6
Level of Service		B	B		B		C	B		B	A	A
Approach Delay (s)		16.4			14.2			15.5			6.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	11.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	46.4	Sum of lost time (s)	10.8
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	07/22/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	9	7	6	0	18	10	18	0	5	210	22	0	52	250	9
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	10	8	7	0	20	11	20	0	6	233	24	0	58	277	10
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		25			51			263			345	
Entry Volume veh/h		25			50			258			338	
Circulating Flow (Vc), pc/h		355			249			76			37	
Exiting Flow (Vex), pc/h		90			27			263			304	
Capacity (cPCE), pc/h		792			881			1047			1089	
Capacity (c), veh/h		777			864			1027			1068	
v/c Ratio (X)		0.03			0.06			0.25			0.32	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.9			4.7			5.9			6.5	
Lane LOS		A			A			A			A	
95% Queue		0.1			0.2			1.0			1.4	
Approach Delay, s/veh	4.9			4.7			5.9			6.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.1						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/11/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	6	9	9	0	10	14	15	0	7	217	11	0	11	236	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	7	10	10	0	11	16	17	0	8	241	12	0	12	262	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		27			44			261			294	
Entry Volume veh/h		26			43			256			288	
Circulating Flow (Vc), pc/h	285			256			29			35		
Exiting Flow (Vex), pc/h	34			44			265			283		
Capacity (cPCE), pc/h		850			875			1098			1091	
Capacity (c), veh/h		833			858			1076			1070	
v/c Ratio (X)		0.03			0.05			0.24			0.27	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.6			4.7			5.6			5.9	
Lane LOS		A			A			A			A	
95% Queue		0.1			0.2			0.9			1.1	
Approach Delay, s/veh	4.6			4.7			5.6			5.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	5.6						A					

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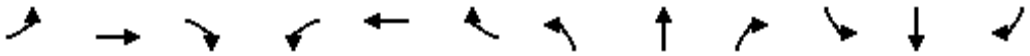


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	5	19	17	9	5	88	137	6	7	94	6
Future Volume (vph)	2	5	19	17	9	5	88	137	6	7	94	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	5	21	18	10	5	96	149	7	8	102	7

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	7	21	33	171	82	59	58
Volume Left (vph)	2	0	18	96	0	8	0
Volume Right (vph)	0	21	5	0	7	0	7
Hadj (s)	0.18	-0.67	0.05	0.32	-0.03	0.10	-0.05
Departure Headway (s)	5.6	4.7	5.4	5.1	4.7	5.0	4.8
Degree Utilization, x	0.01	0.03	0.05	0.24	0.11	0.08	0.08
Capacity (veh/h)	600	705	619	695	743	701	726
Control Delay (s)	7.4	6.7	8.7	8.5	7.1	7.2	7.0
Approach Delay (s)	6.9		8.7	8.0		7.1	
Approach LOS	A		A	A		A	

Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	26.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	80	46	74	56	27	65
Future Volume (vph)	80	46	74	56	27	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	87	50	80	61	29	71

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	87	50	141	100
Volume Left (vph)	87	0	0	29
Volume Right (vph)	0	50	61	0
Hadj (s)	0.53	-0.67	-0.23	0.09
Departure Headway (s)	5.6	4.4	4.1	4.5
Degree Utilization, x	0.13	0.06	0.16	0.12
Capacity (veh/h)	612	779	835	763
Control Delay (s)	8.2	6.5	7.9	8.1
Approach Delay (s)	7.6		7.9	8.1
Approach LOS	A		A	A

Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Year 2013 No Project

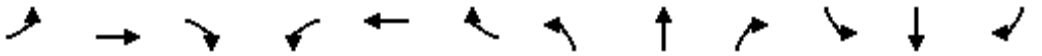
Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #9 Cleveland Street and Mission Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.093
Loss Time (sec):	0	Average Delay (sec/veh):	8.1
Optimal Cycle:	0	Level Of Service:	A

Street Name:	Cleveland Street						Mission Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	0	0 1	0	0 1!	0 0	1	0 1	1 0	1	0 1	1 0
Volume Module:												
Base Vol:	10	10	14	10	13	25	11	91	7	39	111	23
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	10	10	14	10	13	25	11	91	7	39	111	23
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	10	10	14	10	13	25	11	91	7	39	111	23
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	10	10	14	10	13	25	11	91	7	39	111	23
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	10	10	14	10	13	25	11	91	7	39	111	23
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.50	0.50	1.00	0.21	0.27	0.52	1.00	1.86	0.14	1.00	1.66	0.34
Final Sat.:	315	315	755	145	189	363	628	1290	100	646	1199	256
Capacity Analysis Module:												
Vol/Sat:	0.03	0.03	0.02	0.07	0.07	0.07	0.02	0.07	0.07	0.06	0.09	0.09
Crit Moves:	****			****			****			****		
Delay/Veh:	8.3	8.3	7.3	8.3	8.3	8.3	8.4	8.1	8.0	8.5	8.0	7.9
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	8.3	8.3	7.3	8.3	8.3	8.3	8.4	8.1	8.0	8.5	8.0	7.9
LOS by Move:	A	A	A	A	A	A	A	A	A	A	A	A
ApproachDel:	7.9			8.3			8.1			8.1		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	7.9			8.3			8.1			8.1		
LOS by Appr:	A			A			A			A		
AllWayAvgQ:	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1

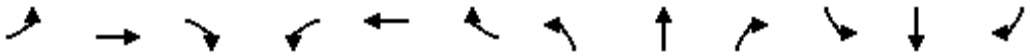
Note: Queue reported is the number of cars per lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	0	23	124	189	64	14	172	0	0	194	15
Future Volume (vph)	11	0	23	124	189	64	14	172	0	0	194	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	0.95		1.00	1.00			0.95	0.95
Frpb, ped/bikes	1.00		0.96	1.00	0.99		1.00	1.00			1.00	0.97
Flpb, ped/bikes	0.99		1.00	0.98	1.00		1.00	1.00			1.00	1.00
Frt	1.00		0.85	1.00	0.96		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1753		1527	1743	3375		1770	1863			1767	1464
Flt Permitted	0.58		1.00	0.95	1.00		0.60	1.00			1.00	1.00
Satd. Flow (perm)	1075		1527	1743	3375		1124	1863			1767	1464
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	0	25	135	205	70	15	187	0	0	211	16
RTOR Reduction (vph)	0	0	11	0	32	0	0	0	0	0	1	10
Lane Group Flow (vph)	12	0	14	135	243	0	15	187	0	0	212	4
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type	Perm		Perm	Perm	NA		Perm	NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases	4		4	8			2					6
Actuated Green, G (s)	27.3		27.3	27.3	27.3		12.7	12.7			12.7	12.7
Effective Green, g (s)	27.3		27.3	27.3	27.3		12.7	12.7			12.7	12.7
Actuated g/C Ratio	0.55		0.55	0.55	0.55		0.25	0.25			0.25	0.25
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0		4.0	4.0			4.0	4.0
Lane Grp Cap (vph)	586		833	951	1842		285	473			448	371
v/s Ratio Prot					0.07			0.10			c0.12	
v/s Ratio Perm	0.01		0.01	c0.08			0.01					0.00
v/c Ratio	0.02		0.02	0.14	0.13		0.05	0.40			0.47	0.01
Uniform Delay, d1	5.2		5.2	5.6	5.6		14.1	15.5			15.8	13.9
Progression Factor	1.00		1.00	1.00	1.00		1.00	1.00			0.26	0.62
Incremental Delay, d2	0.1		0.0	0.3	0.1		0.1	0.7			1.0	0.0
Delay (s)	5.3		5.2	5.9	5.7		14.2	16.2			5.1	8.6
Level of Service	A		A	A	A		B	B			A	A
Approach Delay (s)		5.2			5.8			16.1			5.4	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	132	2	50	462	194	3	14	202	132	10	7
Future Volume (vph)	5	132	2	50	462	194	3	14	202	132	10	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.86		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.96	
Satd. Flow (prot)	1770	3532		1770	3539	1583	1770	1601		1681	1679	
Flt Permitted	0.47	1.00		0.66	1.00	1.00	0.70	1.00		0.61	0.63	
Satd. Flow (perm)	871	3532		1229	3539	1583	1308	1601		1084	1103	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	143	2	54	502	211	3	15	220	143	11	8
RTOR Reduction (vph)	0	1	0	0	0	123	0	164	0	0	6	0
Lane Group Flow (vph)	5	144	0	54	502	88	3	71	0	82	74	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	12.6	12.6		12.2	12.2	12.2	7.5	7.5		7.5	7.5	
Effective Green, g (s)	12.6	12.6		12.2	12.2	12.2	7.5	7.5		7.5	7.5	
Actuated g/C Ratio	0.43	0.43		0.42	0.42	0.42	0.26	0.26		0.26	0.26	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	374	1518		511	1473	659	334	409		277	282	
v/s Ratio Prot		0.04			c0.14			0.04				
v/s Ratio Perm	0.01			0.04		0.06	0.00			c0.08	0.07	
v/c Ratio	0.01	0.09		0.11	0.34	0.13	0.01	0.17		0.30	0.26	
Uniform Delay, d1	4.8	5.0		5.2	5.8	5.3	8.1	8.5		8.8	8.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.0		0.1	0.2	0.1	0.0	0.3		0.8	0.7	
Delay (s)	4.8	5.0		5.3	6.0	5.4	8.1	8.8		9.6	9.4	
Level of Service	A	A		A	A	A	A	A		A	A	
Approach Delay (s)		5.0			5.8			8.8			9.5	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	29.3	Sum of lost time (s)	9.6
Intersection Capacity Utilization	53.3%	ICU Level of Service	A
Analysis Period (min)	15		

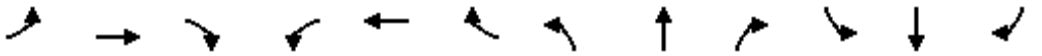
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	35	12	44	60	11	17
Future Volume (Veh/h)	35	12	44	60	11	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	13	48	65	12	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			51		206	44
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			51		206	44
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		98	98
cM capacity (veh/h)			1555		759	1025

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	51	113	30
Volume Left	0	48	12
Volume Right	13	0	18
cSH	1700	1555	899
Volume to Capacity	0.03	0.03	0.03
Queue Length 95th (ft)	0	2	3
Control Delay (s)	0.0	3.3	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	3.3	9.1
Approach LOS			A

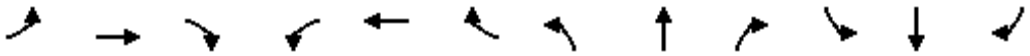
Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	22.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	115	21	0	0	0	23	230	99	37	261	39
Future Volume (vph)	16	115	21	0	0	0	23	230	99	37	261	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Lane Util. Factor	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99					1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98					1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1805					1770	1863	1553	1770	1863	1521
Flt Permitted	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1805					1770	1863	1553	1770	1863	1521
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	125	23	0	0	0	25	250	108	40	284	42
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	82	0	0	31
Lane Group Flow (vph)	17	137	0	0	0	0	25	250	26	40	284	11
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	18.0	18.0					4.0	11.1	11.1	4.8	11.9	11.9
Effective Green, g (s)	18.0	18.0					4.0	11.1	11.1	4.8	11.9	11.9
Actuated g/C Ratio	0.38	0.38					0.09	0.24	0.24	0.10	0.25	0.25
Clearance Time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Vehicle Extension (s)	3.0	3.0					3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	679	692					150	440	367	181	472	385
v/s Ratio Prot	0.01	c0.08					0.01	0.13		c0.02	c0.15	
v/s Ratio Perm									0.02			0.01
v/c Ratio	0.03	0.20					0.17	0.57	0.07	0.22	0.60	0.03
Uniform Delay, d1	9.0	9.6					19.9	15.8	13.9	19.3	15.4	13.2
Progression Factor	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.1	0.6					2.4	2.0	0.1	2.8	2.5	0.0
Delay (s)	9.1	10.3					22.3	17.8	14.0	22.1	17.9	13.2
Level of Service	A	B					C	B	B	C	B	B
Approach Delay (s)		10.2			0.0			17.0			17.8	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	46.9	Sum of lost time (s)	13.0
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		

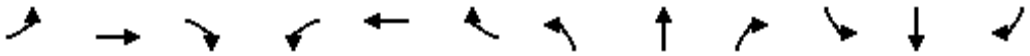
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	240	7	0	0	0	0	10	15	9	7	0
Future Volume (Veh/h)	5	240	7	0	0	0	0	10	15	9	7	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	261	8	0	0	0	0	11	16	10	8	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			269			279	275	134	162	279	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			269			279	275	134	162	279	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	98	98	99	99	100
cM capacity (veh/h)	1622			1292			644	629	890	761	626	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	136	138	27	18
Volume Left	5	0	0	10
Volume Right	0	8	16	0
cSH	1622	1700	761	695
Volume to Capacity	0.00	0.08	0.04	0.03
Queue Length 95th (ft)	0	0	3	2
Control Delay (s)	0.3	0.0	9.9	10.3
Lane LOS	A		A	B
Approach Delay (s)	0.1		9.9	10.3
Approach LOS			A	B

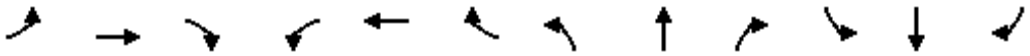
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	21.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	242	3	0	0	0	0	14	10	13	15	0
Future Volume (vph)	17	242	3	0	0	0	0	14	10	13	15	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	263	3	0	0	0	0	15	11	14	16	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	150	135	26	30
Volume Left (vph)	18	0	0	14
Volume Right (vph)	0	3	11	0
Hadj (s)	0.09	0.02	-0.22	0.13
Departure Headway (s)	4.7	4.7	4.4	4.7
Degree Utilization, x	0.20	0.17	0.03	0.04
Capacity (veh/h)	751	758	778	719
Control Delay (s)	7.7	7.4	7.5	7.9
Approach Delay (s)	7.6		7.5	7.9
Approach LOS	A		A	A

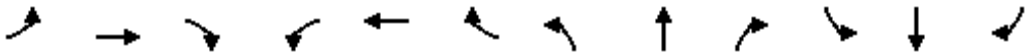
Intersection Summary				
Delay	7.6			
Level of Service	A			
Intersection Capacity Utilization	22.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	142	122	1	4	0	3	0	17	9	0	0	0
Future Volume (vph)	142	122	1	4	0	3	0	17	9	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	154	133	1	4	0	3	0	18	10	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	154	134	7	28
Volume Left (vph)	154	0	4	0
Volume Right (vph)	0	1	3	10
Hadj (s)	0.53	0.03	-0.11	-0.18
Departure Headway (s)	5.1	4.6	4.2	4.4
Degree Utilization, x	0.22	0.17	0.01	0.03
Capacity (veh/h)	698	769	833	773
Control Delay (s)	8.3	7.3	7.3	7.5
Approach Delay (s)	7.9		7.3	7.5
Approach LOS	A		A	A

Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	22.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	13	0	0	11	13	263	7	5	272	6
Future Volume (Veh/h)	0	0	13	0	0	11	13	263	7	5	272	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	14	0	0	12	14	286	8	5	296	7
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			440	
pX, platoon unblocked												
vC, conflicting volume	644	646	306	645	645	298	310			301		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	644	646	306	645	645	298	310			301		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	98	99			100		
cM capacity (veh/h)	370	380	729	368	380	737	1243			1253		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	14	12	14	294	5	303
Volume Left	0	0	14	0	5	0
Volume Right	14	12	0	8	0	7
cSH	729	737	1243	1700	1253	1700
Volume to Capacity	0.02	0.02	0.01	0.17	0.00	0.18
Queue Length 95th (ft)	1	1	1	0	0	0
Control Delay (s)	10.0	10.0	7.9	0.0	7.9	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	10.0	10.0	0.4		0.1	
Approach LOS	B	A				

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	24.7%	ICU Level of Service		A
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	4	1	7	0	15	3	3	0	5	278	8	0	2	290	5
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	4	1	8	0	17	3	3	0	6	308	9	0	2	322	6
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		13			23			323			330	
Entry Volume veh/h		13			23			317			324	
Circulating Flow (Vc), pc/h	341			318			7			26		
Exiting Flow (Vex), pc/h	12			15			315			347		
Capacity (cPCE), pc/h		804			822			1122			1101	
Capacity (c), veh/h		788			806			1100			1079	
v/c Ratio (X)		0.02			0.03			0.29			0.30	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.7			4.7			6.0			6.3	
Lane LOS		A			A			A			A	
95% Queue		0.0			0.1			1.2			1.3	
Approach Delay, s/veh	4.7			4.7			6.0			6.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.1						A					

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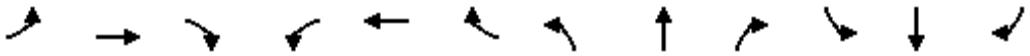
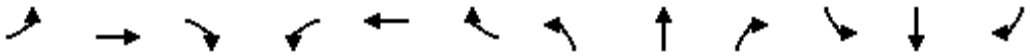


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	25	33	29	13	4	34	5	69	20	40	47	1
Future Volume (vph)	25	33	29	13	4	34	5	69	20	40	47	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	36	32	14	4	37	5	75	22	43	51	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	95	55	102	95
Volume Left (vph)	27	14	5	43
Volume Right (vph)	32	37	22	1
Hadj (s)	-0.11	-0.32	-0.09	0.12
Departure Headway (s)	4.3	4.1	4.3	4.5
Degree Utilization, x	0.11	0.06	0.12	0.12
Capacity (veh/h)	797	813	807	765
Control Delay (s)	7.8	7.4	7.8	8.1
Approach Delay (s)	7.8	7.4	7.8	8.1
Approach LOS	A	A	A	A

Intersection Summary				
Delay		7.8		
Level of Service		A		
Intersection Capacity Utilization		24.9%	ICU Level of Service	A
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	126	10	2	58	10	5	12	13	14	17	7
Future Volume (Veh/h)	5	126	10	2	58	10	5	12	13	14	17	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	137	11	2	63	11	5	13	14	15	18	8
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	88			155			250	252	150	260	252	84
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88			155			250	252	150	260	252	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	98	98	98	97	99
cM capacity (veh/h)	1490			1417			667	637	892	653	637	964

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	153	76	32	41
Volume Left	5	2	5	15
Volume Right	11	11	14	8
cSH	1490	1417	734	689
Volume to Capacity	0.00	0.00	0.04	0.06
Queue Length 95th (ft)	0	0	3	5
Control Delay (s)	0.3	0.2	10.1	10.6
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.2	10.1	10.6
Approach LOS			B	B

Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	21.4%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	36	26	92	0	42	14	13	0	45	257	30	0	8	283	12
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	40	29	102	0	47	16	14	0	50	285	33	0	9	314	13
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		171			77			368			336	
Entry Volume veh/h		168			75			361			329	
Circulating Flow (Vc), pc/h	370			375			78			113		
Exiting Flow (Vex), pc/h	71			79			339			463		
Capacity (cPCE), pc/h		781			777			1045			1009	
Capacity (c), veh/h		765			761			1025			989	
v/c Ratio (X)		0.22			0.10			0.35			0.33	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.1			5.7			7.2			7.1	
Lane LOS		A			A			A			A	
95% Queue		0.8			0.3			1.6			1.5	
Approach Delay, s/veh	7.1			5.7			7.2			7.1		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	7.0						A					

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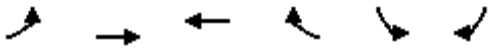
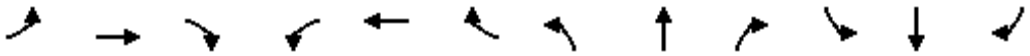


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	60	58	3	10	9
Future Volume (Veh/h)	5	60	58	3	10	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	65	63	3	11	10
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	74				148	74
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	74				148	74
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	99
cM capacity (veh/h)	1515				834	981

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	70	66	21
Volume Left	5	0	11
Volume Right	0	3	10
cSH	1515	1700	898
Volume to Capacity	0.00	0.04	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.6	0.0	9.1
Lane LOS	A		A
Approach Delay (s)	0.6	0.0	9.1
Approach LOS			A

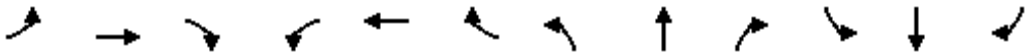
Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	17.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	56	5	12	53	7	3	4	8	22	1	3
Future Volume (Veh/h)	4	56	5	12	53	7	3	4	8	22	1	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	61	5	13	58	8	3	4	9	24	1	3
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	68			66			165	166	64	172	164	66
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	68			66			165	166	64	172	164	66
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	99	99	97	100	100
cM capacity (veh/h)	1531			1536			787	718	1001	771	719	994

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	70	79	16	28
Volume Left	4	13	3	24
Volume Right	5	8	9	3
cSH	1531	1536	871	788
Volume to Capacity	0.00	0.01	0.02	0.04
Queue Length 95th (ft)	0	1	1	3
Control Delay (s)	0.4	1.3	9.2	9.7
Lane LOS	A	A	A	A
Approach Delay (s)	0.4	1.3	9.2	9.7
Approach LOS			A	A

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	19.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	33	52	20	42	0	28	0	10	0	2	0
Future Volume (vph)	0	33	52	20	42	0	28	0	10	0	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	36	57	22	46	0	30	0	11	0	2	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	93	68	41	2
Volume Left (vph)	0	22	30	0
Volume Right (vph)	57	0	11	0
Hadj (s)	-0.33	0.10	0.02	0.03
Departure Headway (s)	3.7	4.2	4.3	4.3
Degree Utilization, x	0.10	0.08	0.05	0.00
Capacity (veh/h)	945	846	808	798
Control Delay (s)	7.1	7.5	7.5	7.3
Approach Delay (s)	7.1	7.5	7.5	7.3
Approach LOS	A	A	A	A

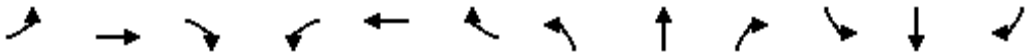
Intersection Summary				
Delay	7.3			
Level of Service	A			
Intersection Capacity Utilization	25.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	32	46	51	20	54	61
Future Volume (vph)	32	46	51	20	54	61
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	50	55	22	59	66

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	85	77	125
Volume Left (vph)	35	0	59
Volume Right (vph)	50	22	0
Hadj (s)	-0.24	-0.14	0.13
Departure Headway (s)	4.1	4.1	4.3
Degree Utilization, x	0.10	0.09	0.15
Capacity (veh/h)	834	851	818
Control Delay (s)	7.5	7.5	8.0
Approach Delay (s)	7.5	7.5	8.0
Approach LOS	A	A	A

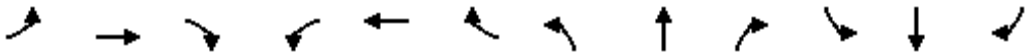
Intersection Summary			
Delay	7.7		
Level of Service	A		
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	132	1	6	106	22	6	7	11	22	11	5
Future Volume (Veh/h)	4	132	1	6	106	22	6	7	11	22	11	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	143	1	7	115	24	7	8	12	24	12	5
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.96						0.96	0.96		0.96	0.96	0.96
vC, conflicting volume	142			155			318	318	162	320	307	134
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	93			155			276	276	162	277	264	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	99	99	96	98	99
cM capacity (veh/h)	1446			1412			623	598	868	621	607	935

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	148	146	27	41
Volume Left	4	7	7	24
Volume Right	1	24	12	5
cSH	1446	1412	702	643
Volume to Capacity	0.00	0.00	0.04	0.06
Queue Length 95th (ft)	0	0	3	5
Control Delay (s)	0.2	0.4	10.3	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.4	10.3	11.0
Approach LOS			B	B

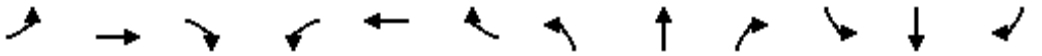
Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	22.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	97	52	113	98	109	27	216	60	119	274	11
Future Volume (vph)	15	97	52	113	98	109	27	216	60	119	274	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.96	1.00	1.00	0.93	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1851	1526	1681	1761	1465	1770	3411		1770	1847	
Flt Permitted		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1851	1526	1681	1761	1465	1770	3411		1770	1847	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	105	57	123	107	118	29	235	65	129	298	12
RTOR Reduction (vph)	0	0	51	0	0	103	0	19	0	0	1	0
Lane Group Flow (vph)	0	121	6	111	119	15	29	281	0	129	309	0
Confl. Peds. (#/hr)	14		10	10		14			3			15
Confl. Bikes (#/hr)			4			5			3			3
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		10.9	10.9	12.5	12.5	12.5	4.3	46.2		11.6	53.5	
Effective Green, g (s)		10.9	10.9	12.5	12.5	12.5	4.3	46.2		11.6	53.5	
Actuated g/C Ratio		0.11	0.11	0.12	0.12	0.12	0.04	0.46		0.12	0.54	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.5		2.0	3.5	
Lane Grp Cap (vph)		201	166	210	220	183	76	1575		205	988	
v/s Ratio Prot		c0.07		0.07	c0.07		0.02	0.08		c0.07	c0.17	
v/s Ratio Perm			0.00			0.01						
v/c Ratio		0.60	0.04	0.53	0.54	0.08	0.38	0.18		0.63	0.31	
Uniform Delay, d1		42.5	39.9	41.0	41.1	38.7	46.6	15.8		42.1	13.0	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.5	0.0	2.7	3.0	0.2	1.2	0.2		4.3	0.8	
Delay (s)		45.9	39.9	43.7	44.1	38.9	47.7	16.0		46.5	13.8	
Level of Service		D	D	D	D	D	D	B		D	B	
Approach Delay (s)		44.0			42.2			18.8			23.4	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	30.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

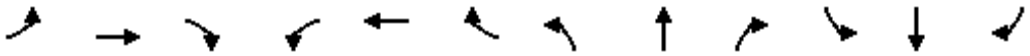
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	274	0	16	353	28	8	5	34	86	8	16
Future Volume (vph)	4	274	0	16	353	28	8	5	34	86	8	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3539		1765	3497			3095			1781	1551
Flt Permitted	0.82	1.00		0.82	1.00			0.94			1.00	1.00
Satd. Flow (perm)	1521	3539		1517	3497			2927			1862	1551
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	298	0	17	384	30	9	5	37	93	9	17
RTOR Reduction (vph)	0	0	0	0	13	0	0	31	0	0	0	14
Lane Group Flow (vph)	4	298	0	17	401	0	0	20	0	0	102	3
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	4.9	4.9		4.9	4.9			2.6			2.6	2.6
Effective Green, g (s)	4.9	4.9		4.9	4.9			2.6			2.6	2.6
Actuated g/C Ratio	0.29	0.29		0.29	0.29			0.15			0.15	0.15
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	438	1020		437	1007			447			284	237
v/s Ratio Prot		0.08			c0.11							
v/s Ratio Perm	0.00			0.01				0.01			c0.05	0.00
v/c Ratio	0.01	0.29		0.04	0.40			0.04			0.36	0.01
Uniform Delay, d1	4.3	4.7		4.4	4.9			6.1			6.5	6.1
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.0	0.2		0.0	0.3			0.1			1.1	0.0
Delay (s)	4.3	4.9		4.4	5.1			6.2			7.5	6.1
Level of Service	A	A		A	A			A			A	A
Approach Delay (s)		4.9			5.1			6.2			7.3	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	17.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

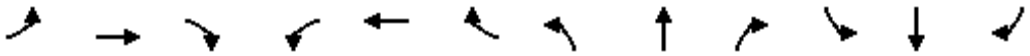
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	8	13	13	5	48	2	292	26	40	394	13
Future Volume (vph)	19	8	13	13	5	48	2	292	26	40	394	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		0.98			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1728			1794	1557	1770	3489		1770	3519	
Flt Permitted		1.00			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1769			1860	1557	1770	3489		1770	3519	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	9	14	14	5	52	2	317	28	43	428	14
RTOR Reduction (vph)	0	13	0	0	0	48	0	8	0	0	3	0
Lane Group Flow (vph)	0	31	0	0	19	4	2	337	0	43	439	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		2.6			2.6	2.6	0.6	17.4		0.6	17.4	
Effective Green, g (s)		2.6			2.6	2.6	0.6	17.4		0.6	17.4	
Actuated g/C Ratio		0.08			0.08	0.08	0.02	0.51		0.02	0.51	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		134			140	118	30	1769		30	1785	
v/s Ratio Prot							0.00	0.10		c0.02	c0.12	
v/s Ratio Perm		c0.02			0.01	0.00						
v/c Ratio		0.23			0.14	0.03	0.07	0.19		1.43	0.25	
Uniform Delay, d1		14.9			14.8	14.7	16.6	4.6		16.8	4.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.2	0.0	0.9	0.1		317.1	0.1	
Delay (s)		15.2			15.0	14.7	17.5	4.7		333.9	4.8	
Level of Service		B			B	B	B	A		F	A	
Approach Delay (s)		15.2			14.8			4.7			34.0	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.28		
Actuated Cycle Length (s)	34.3	Sum of lost time (s)	13.7
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

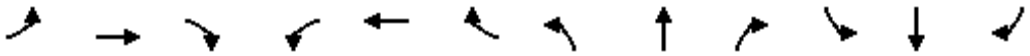
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	60	7	11	52	0	6	0	9	0	0	0
Future Volume (Veh/h)	0	60	7	11	52	0	6	0	9	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	65	8	12	57	0	7	0	10	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	57			73			150	150	69	160	154	57
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	57			73			150	150	69	160	154	57
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	100	99	100	100	100
cM capacity (veh/h)	1547			1527			813	736	994	793	732	1009

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	73	69	17	0
Volume Left	0	12	7	0
Volume Right	8	0	10	0
cSH	1547	1527	910	1700
Volume to Capacity	0.00	0.01	0.02	0.00
Queue Length 95th (ft)	0	1	1	0
Control Delay (s)	0.0	1.3	9.0	0.0
Lane LOS		A	A	A
Approach Delay (s)	0.0	1.3	9.0	0.0
Approach LOS			A	A

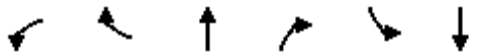
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	20.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	28	4	1	20	1	7	0	3	1	0	1
Future Volume (Veh/h)	1	28	4	1	20	1	7	0	3	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	30	4	1	22	1	8	0	3	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	23			34			60	59	32	62	60	22
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	23			34			60	59	32	62	60	22
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	100	100	100	100
cM capacity (veh/h)	1592			1578			935	831	1042	930	829	1054

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	35	24	11	2
Volume Left	1	1	8	1
Volume Right	4	1	3	1
cSH	1592	1578	962	988
Volume to Capacity	0.00	0.00	0.01	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.2	0.3	8.8	8.6
Lane LOS	A	A	A	A
Approach Delay (s)	0.2	0.3	8.8	8.6
Approach LOS			A	A

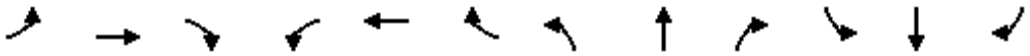
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	13.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	16	54	6	16	67	6
Future Volume (vph)	16	54	6	16	67	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	59	7	17	73	7

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	76	24	80
Volume Left (vph)	17	0	73
Volume Right (vph)	59	17	0
Hadj (s)	-0.39	-0.39	0.22
Departure Headway (s)	3.7	3.7	4.3
Degree Utilization, x	0.08	0.02	0.10
Capacity (veh/h)	933	927	820
Control Delay (s)	7.1	6.8	7.7
Approach Delay (s)	7.1	6.8	7.7
Approach LOS	A	A	A

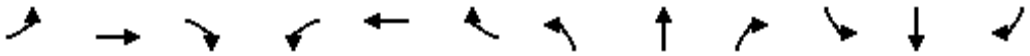
Intersection Summary			
Delay	7.3		
Level of Service	A		
Intersection Capacity Utilization	21.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	101	45	8	67	2	34	5	8	9	6	3
Future Volume (Veh/h)	2	101	45	8	67	2	34	5	8	9	6	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	110	49	9	73	2	37	5	9	10	7	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	75			159			237	232	134	242	255	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	75			159			237	232	134	242	255	74
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			95	99	99	99	99	100
cM capacity (veh/h)	1524			1420			705	663	914	697	644	988

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	161	84	51	20
Volume Left	2	9	37	10
Volume Right	49	2	9	3
cSH	1524	1420	730	708
Volume to Capacity	0.00	0.01	0.07	0.03
Queue Length 95th (ft)	0	0	6	2
Control Delay (s)	0.1	0.9	10.3	10.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.9	10.3	10.2
Approach LOS			B	B

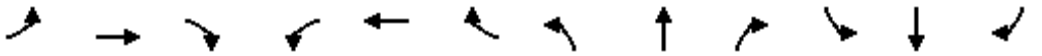
Intersection Summary				
Average Delay	2.6			
Intersection Capacity Utilization	19.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	116	7	5	72	10	2	3	14	4	4	3
Future Volume (Veh/h)	0	116	7	5	72	10	2	3	14	4	4	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	126	8	5	78	11	2	3	15	4	4	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	89			134			228	229	130	240	228	84
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			134			228	229	130	240	228	84
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	99	99	100
cM capacity (veh/h)	1506			1451			719	668	920	698	670	976

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	134	94	20	11
Volume Left	0	5	2	4
Volume Right	8	11	15	3
cSH	1506	1451	848	744
Volume to Capacity	0.00	0.00	0.02	0.01
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	0.4	9.3	9.9
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.4	9.3	9.9
Approach LOS			A	A

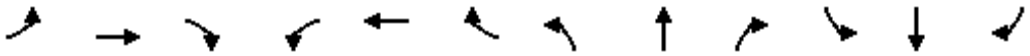
Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	18.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	69	45	35	32	17	57	269	32	40	295	11
Future Volume (vph)	24	69	45	35	32	17	57	269	32	40	295	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.96			0.97		1.00	0.98		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1765			1776		1770	3482		1770	3520	
Flt Permitted		0.92			0.89		0.95	1.00		0.55	1.00	
Satd. Flow (perm)		1635			1621		1770	3482		1032	3520	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	75	49	38	35	18	62	292	35	43	321	12
RTOR Reduction (vph)	0	29	0	0	15	0	0	13	0	0	3	0
Lane Group Flow (vph)	0	121	0	0	76	0	62	314	0	43	330	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		5.2			4.8		2.2	21.9		15.5	15.5	
Effective Green, g (s)		5.2			4.8		2.2	21.9		15.5	15.5	
Actuated g/C Ratio		0.14			0.13		0.06	0.60		0.42	0.42	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		231			212		106	2077		435	1486	
v/s Ratio Prot							c0.04	0.09			c0.09	
v/s Ratio Perm		c0.07			0.05					0.04		
v/c Ratio		0.52			0.36		0.58	0.15		0.10	0.22	
Uniform Delay, d1		14.6			14.5		16.8	3.3		6.4	6.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.1			1.2		5.2	0.0		0.1	0.1	
Delay (s)		16.7			15.8		22.0	3.3		6.5	6.8	
Level of Service		B			B		C	A		A	A	
Approach Delay (s)		16.7			15.8			6.3			6.8	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	36.7	Sum of lost time (s)	14.2
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

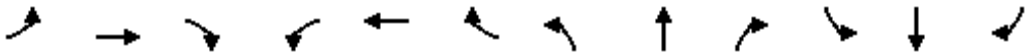
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	136	5	6	77	5	2	6	5	4	5	7
Future Volume (Veh/h)	6	136	5	6	77	5	2	6	5	4	5	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	148	5	7	84	5	2	7	5	4	5	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	89			153			276	268	150	274	268	86
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			153			276	268	150	274	268	86
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	99	99	99	99	99
cM capacity (veh/h)	1506			1428			662	632	896	665	632	972

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	160	96	14	17
Volume Left	7	7	2	4
Volume Right	5	5	5	8
cSH	1506	1428	712	767
Volume to Capacity	0.00	0.00	0.02	0.02
Queue Length 95th (ft)	0	0	2	2
Control Delay (s)	0.4	0.6	10.2	9.8
Lane LOS	A	A	B	A
Approach Delay (s)	0.4	0.6	10.2	9.8
Approach LOS			B	A

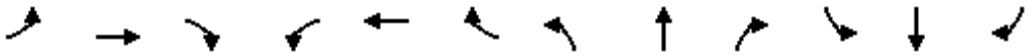
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	19.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	152	5	3	93	1	4	8	7	5	4	3
Future Volume (vph)	2	152	5	3	93	1	4	8	7	5	4	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	165	5	3	101	1	4	9	8	5	4	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	172	105	21	12
Volume Left (vph)	2	3	4	5
Volume Right (vph)	5	1	8	3
Hadj (s)	0.02	0.03	-0.16	-0.03
Departure Headway (s)	4.1	4.2	4.4	4.5
Degree Utilization, x	0.20	0.12	0.03	0.01
Capacity (veh/h)	864	846	770	741
Control Delay (s)	8.1	7.8	7.5	7.6
Approach Delay (s)	8.1	7.8	7.5	7.6
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.9			
Level of Service	A			
Intersection Capacity Utilization	19.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	173	4	21	79	12	4	33	88	93	6	5
Future Volume (vph)	5	173	4	21	79	12	4	33	88	93	6	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	188	4	23	86	13	4	36	96	101	7	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	197	122	136	113
Volume Left (vph)	5	23	4	101
Volume Right (vph)	4	13	96	5
Hadj (s)	0.03	0.01	-0.38	0.19
Departure Headway (s)	4.7	4.8	4.5	5.0
Degree Utilization, x	0.26	0.16	0.17	0.16
Capacity (veh/h)	719	702	748	660
Control Delay (s)	9.3	8.7	8.4	9.0
Approach Delay (s)	9.3	8.7	8.4	9.0
Approach LOS	A	A	A	A

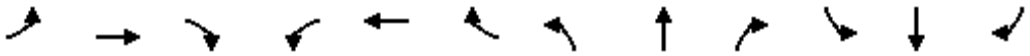
Intersection Summary				
Delay	8.9			
Level of Service	A			
Intersection Capacity Utilization	38.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	4	23	14	6	32	28
Future Volume (vph)	4	23	14	6	32	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	25	15	7	35	30

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	29	22	65
Volume Left (vph)	4	0	35
Volume Right (vph)	25	7	0
Hadj (s)	-0.46	-0.16	0.14
Departure Headway (s)	3.6	3.9	4.1
Degree Utilization, x	0.03	0.02	0.07
Capacity (veh/h)	963	909	863
Control Delay (s)	6.7	7.0	7.4
Approach Delay (s)	6.7	7.0	7.4
Approach LOS	A	A	A

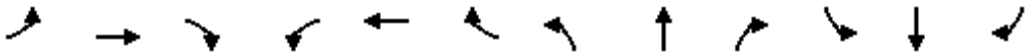
Intersection Summary			
Delay	7.2		
Level of Service	A		
Intersection Capacity Utilization	19.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	81	26	218	33	185	19	163	104	157	230	4
Future Volume (vph)	10	81	26	218	33	185	19	163	104	157	230	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.94		1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1553		1785	1583	1770	3286		1770	3529	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1553		1785	1583	1770	3286		1770	3529	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	88	28	237	36	201	21	177	113	171	250	4
RTOR Reduction (vph)	0	0	26	0	0	165	0	67	0	0	1	0
Lane Group Flow (vph)	11	88	2	0	273	36	21	223	0	171	253	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	Over	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	5.6	5.6	5.6		16.8	12.0	2.2	14.0		12.0	23.8	
Effective Green, g (s)	5.6	5.6	5.6		16.8	12.0	2.2	14.0		12.0	23.8	
Actuated g/C Ratio	0.08	0.08	0.08		0.25	0.18	0.03	0.21		0.18	0.35	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	146	154	128		444	281	57	681		314	1244	
v/s Ratio Prot	0.01	c0.05			c0.15	0.02	0.01	c0.07		c0.10	0.07	
v/s Ratio Perm			0.00									
v/c Ratio	0.08	0.57	0.02		0.61	0.13	0.37	0.33		0.54	0.20	
Uniform Delay, d1	28.6	29.8	28.4		22.5	23.3	32.0	22.7		25.3	15.2	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	3.2	0.0		2.5	0.1	1.5	0.3		1.0	0.1	
Delay (s)	28.6	33.0	28.4		25.0	23.4	33.4	23.0		26.3	15.3	
Level of Service	C	C	C		C	C	C	C		C	B	
Approach Delay (s)		31.6			24.3			23.7			19.7	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	67.5	Sum of lost time (s)	19.1
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

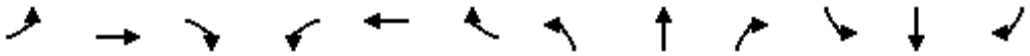
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	300	1	3	447	18	0	0	5	10	0	11
Future Volume (Veh/h)	3	300	1	3	447	18	0	0	5	10	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	326	1	3	486	20	0	0	5	11	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.98			0.98	0.98	0.98	0.98	0.98	
vC, conflicting volume	506			327			846	844	326	840	835	496
vC1, stage 1 conf vol							332	332		502	502	
vC2, stage 2 conf vol							514	512		338	333	
vCu, unblocked vol	506			301			832	830	300	825	820	496
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	98	100	98
cM capacity (veh/h)	1059			1233			468	470	723	480	475	574

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	330	509	5	23
Volume Left	3	3	0	11
Volume Right	1	20	5	12
cSH	1059	1233	723	525
Volume to Capacity	0.00	0.00	0.01	0.04
Queue Length 95th (ft)	0	0	1	3
Control Delay (s)	0.1	0.1	10.0	12.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.1	10.0	12.2
Approach LOS			B	B

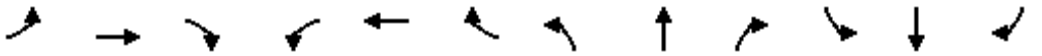
Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	41.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	315	2	6	496	10	2	1	13	12	1	6
Future Volume (Veh/h)	4	315	2	6	496	10	2	1	13	12	1	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	342	2	7	539	11	2	1	14	13	1	7
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked												
vC, conflicting volume	550			345			919	916	344	924	912	546
vC1, stage 1 conf vol							352	352		558	558	
vC2, stage 2 conf vol							567	564		366	353	
vCu, unblocked vol	550			345			919	916	344	924	912	546
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	98	97	100	99
cM capacity (veh/h)	1020			1213			438	444	698	441	446	537

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	348	557	17	21
Volume Left	4	7	2	13
Volume Right	2	11	14	7
cSH	1020	1213	633	469
Volume to Capacity	0.00	0.01	0.03	0.04
Queue Length 95th (ft)	0	0	2	4
Control Delay (s)	0.1	0.2	10.8	13.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.2	10.8	13.0
Approach LOS			B	B

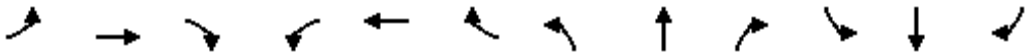
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	40.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	386	1	6	498	66	0	0	5	1	0	10
Future Volume (Veh/h)	14	386	1	6	498	66	0	0	5	1	0	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	420	1	7	541	72	0	0	5	1	0	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	613			421			1016	1078	420	1046	1042	577
vC1, stage 1 conf vol							450	450		591	591	
vC2, stage 2 conf vol							566	627		456	451	
vCu, unblocked vol	613			421			1016	1078	420	1046	1042	577
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			99			100	100	99	100	100	98
cM capacity (veh/h)	966			1138			406	394	633	405	411	516

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	436	7	613	5	12
Volume Left	15	7	0	0	1
Volume Right	1	0	72	5	11
cSH	966	1138	1700	633	505
Volume to Capacity	0.02	0.01	0.36	0.01	0.02
Queue Length 95th (ft)	1	0	0	1	2
Control Delay (s)	0.5	8.2	0.0	10.7	12.3
Lane LOS	A	A		B	B
Approach Delay (s)	0.5	0.1		10.7	12.3
Approach LOS				B	B

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	33	5	0	5	14	222	4	7	502	5
Future Volume (Veh/h)	0	0	33	5	0	5	14	222	4	7	502	5
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	36	5	0	5	15	241	4	8	546	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	720	840	548	871	840	122	551			245		
vC1, stage 1 conf vol	564	564		273	273							
vC2, stage 2 conf vol	156	275		598	567							
vCu, unblocked vol	720	840	548	871	840	122	551			245		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	99	100	99	99			99		
cM capacity (veh/h)	451	457	480	378	448	906	1015			1318		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	36	10	15	161	84	8	551
Volume Left	0	5	15	0	0	8	0
Volume Right	36	5	0	0	4	0	5
cSH	480	533	1015	1700	1700	1318	1700
Volume to Capacity	0.08	0.02	0.01	0.09	0.05	0.01	0.32
Queue Length 95th (ft)	6	1	1	0	0	0	0
Control Delay (s)	13.1	11.9	8.6	0.0	0.0	7.7	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	13.1	11.9	0.5			0.1	
Approach LOS	B	B					

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	56	8	23	0	30	9	5	0	14	301	4	0	4	295	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	62	9	26	0	33	10	6	0	16	334	4	0	4	327	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		97			49			354			350	
Entry Volume veh/h		95			48			347			343	
Circulating Flow (Vc), pc/h	364			412			75			59		
Exiting Flow (Vex), pc/h	17			45			402			386		
Capacity (cPCE), pc/h		785			748			1048			1065	
Capacity (c), veh/h		770			734			1028			1044	
v/c Ratio (X)		0.12			0.07			0.34			0.33	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.0			5.6			7.0			6.8	
Lane LOS		A			A			A			A	
95% Queue		0.4			0.2			1.5			1.4	
Approach Delay, s/veh	6.0			5.6			7.0			6.8		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.7						A					

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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	275	188	948	561	0	0
Future Volume (veh/h)	275	188	948	561	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863		
Adj Flow Rate, veh/h	299	204	1030	610		
Adj No. of Lanes	2	1	2	3		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1416	633	1377	4577		
Arrive On Green	0.40	0.40	0.40	0.90		
Sat Flow, veh/h	3632	1583	3442	5253		
Grp Volume(v), veh/h	299	204	1030	610		
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1695		
Q Serve(g_s), s	2.2	3.5	10.3	0.5		
Cycle Q Clear(g_c), s	2.2	3.5	10.3	0.5		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1416	633	1377	4577		
V/C Ratio(X)	0.21	0.32	0.75	0.13		
Avail Cap(c_a), veh/h	1416	633	1377	4577		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	7.9	8.3	10.3	0.2		
Incr Delay (d2), s/veh	0.3	1.3	3.8	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.1	1.8	5.4	0.3		
LnGrp Delay(d),s/veh	8.2	9.6	14.0	0.3		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	503			1640		
Approach Delay, s/veh	8.8			8.9		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			20.0	20.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s			12.3	5.5				2.5
Green Ext Time (p_c), s			1.6	1.9				4.7

Intersection Summary	
HCM 2010 Ctrl Delay	8.9
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	275	188	948	561	0	0
Future Volume (veh/h)	275	188	948	561	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	299	204	1030	610		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1472	659	1432	3313		
Arrive On Green	0.40	0.40	0.40	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	299	204	1030	610		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	2.1	3.4	9.7	0.8		
Cycle Q Clear(g_c), s	2.1	3.4	9.7	0.8		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1472	659	1432	3313		
V/C Ratio(X)	0.20	0.31	0.72	0.18		
Avail Cap(c_a), veh/h	1472	659	1432	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	7.8	8.2	10.1	0.2		
Incr Delay (d2), s/veh	0.3	1.2	3.1	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.1	1.8	5.3	0.4		
LnGrp Delay(d),s/veh	8.1	9.4	13.3	0.4		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	503			1640		
Approach Delay, s/veh	8.7			8.5		
Approach LOS	A			A		

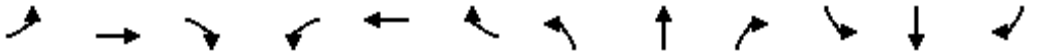
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			20.0	20.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s			11.7	5.4				2.8
Green Ext Time (p_c), s			1.8	2.0				4.7

Intersection Summary	
HCM 2010 Ctrl Delay	8.5
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	466	79	980	1434	79	1
Future Volume (veh/h)	466	79	980	1434	79	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	507	86	1065	1559	86	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	982	439	954	2208	492	439
Arrive On Green	0.27	0.27	0.27	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	507	86	1065	1559	86	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	7.0	2.4	16.0	17.6	2.2	0.0
Cycle Q Clear(g_c), s	7.0	2.4	16.0	17.6	2.2	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	982	439	954	2208	492	439
V/C Ratio(X)	0.52	0.20	1.12	0.71	0.17	0.00
Avail Cap(c_a), veh/h	982	439	954	2208	492	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	18.7	17.0	22.0	8.3	16.9	0.0
Incr Delay (d2), s/veh	1.9	1.0	66.4	1.9	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.8	1.2	16.6	9.3	1.2	0.0
LnGrp Delay(d),s/veh	20.7	18.0	88.4	10.3	17.7	0.0
LnGrp LOS	C	B	F	B	B	
Approach Vol, veh/h	593			2624	86	
Approach Delay, s/veh	20.3			42.0	17.7	
Approach LOS	C			D	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		4.2	18.0	9.0				19.6
Green Ext Time (p_c), s		0.1	0.0	2.1				10.6

Intersection Summary	
HCM 2010 Ctrl Delay	37.4
HCM 2010 LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	502	6	183	871	718	17	0	219	90	71	82
Future Volume (veh/h)	0	502	6	183	871	718	17	0	219	90	71	82
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	546	7	199	947	0	18	0	238	88	92	89
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1145	15	284	1982	887	0	0	0	568	596	507
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3818	48	1845	3681	1647		0		1845	1937	1647
Grp Volume(v), veh/h	0	270	283	199	947	0		0.0		88	92	89
Grp Sat Flow(s),veh/h/ln	0	1840	1929	1845	1840	1647				1845	1937	1647
Q Serve(g_s), s	0.0	6.2	6.2	5.3	8.3	0.0				1.8	1.8	2.1
Cycle Q Clear(g_c), s	0.0	6.2	6.2	5.3	8.3	0.0				1.8	1.8	2.1
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	566	593	284	1982	887				568	596	507
V/C Ratio(X)	0.00	0.48	0.48	0.70	0.48	0.00				0.16	0.15	0.18
Avail Cap(c_a), veh/h	0	566	593	284	1982	887				568	596	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	14.6	14.6	20.9	7.5	0.0				13.1	13.1	13.2
Incr Delay (d2), s/veh	0.0	2.9	2.7	13.5	0.8	0.0				0.6	0.6	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	3.6	3.8	3.8	4.3	0.0				1.0	1.0	1.0
LnGrp Delay(d),s/veh	0.0	17.5	17.3	34.4	8.3	0.0				13.7	13.6	13.9
LnGrp LOS		B	B	C	A					B	B	B
Approach Vol, veh/h		553			1146						269	
Approach Delay, s/veh		17.4			12.8						13.7	
Approach LOS		B			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			7.3	8.2		4.1		10.3
Green Ext Time (p_c), s			0.0	2.0		0.8		6.5

Intersection Summary	
HCM 2010 Ctrl Delay	14.2
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	325	393	13	22	517	506	24	29	48	197	5	80
Future Volume (veh/h)	325	393	13	22	517	506	24	29	48	197	5	80
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	353	427	14	24	562	550	26	32	52	153	90	87
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	369	1273	42	92	736	659	170	209	329	369	181	175
Arrive On Green	0.20	0.35	0.35	0.05	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1845	3638	119	1845	3681	1647	849	1045	1647	1845	906	876
Grp Volume(v), veh/h	353	216	225	24	562	550	58	0	52	153	0	177
Grp Sat Flow(s),veh/h/ln	1845	1840	1916	1845	1840	1647	1895	0	1647	1845	0	1783
Q Serve(g_s), s	15.1	6.9	6.9	1.0	11.5	16.0	2.0	0.0	2.1	5.8	0.0	7.1
Cycle Q Clear(g_c), s	15.1	6.9	6.9	1.0	11.5	16.0	2.0	0.0	2.1	5.8	0.0	7.1
Prop In Lane	1.00		0.06	1.00		1.00	0.45		1.00	1.00		0.49
Lane Grp Cap(c), veh/h	369	644	671	92	736	659	379	0	329	369	0	357
V/C Ratio(X)	0.96	0.33	0.34	0.26	0.76	0.84	0.15	0.00	0.16	0.41	0.00	0.50
Avail Cap(c_a), veh/h	369	644	671	92	736	659	379	0	329	369	0	357
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.7	19.1	19.2	36.6	30.2	19.2	26.4	0.0	26.4	27.9	0.0	28.4
Incr Delay (d2), s/veh	37.1	1.4	1.4	6.7	7.4	11.9	0.9	0.0	1.0	3.4	0.0	4.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	3.7	3.9	0.7	6.6	14.3	1.1	0.0	1.0	3.3	0.0	3.9
LnGrp Delay(d),s/veh	68.8	20.5	20.5	43.3	37.6	31.1	27.3	0.0	27.5	31.3	0.0	33.3
LnGrp LOS	E	C	C	D	D	C	C		C	C		C
Approach Vol, veh/h		794			1136			110			330	
Approach Delay, s/veh		42.0			34.6			27.4			32.4	
Approach LOS		D			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	32.0		20.0	20.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	28.0		16.0	16.0	16.0
Max Q Clear Time (g_c+I1), s		4.1	3.0	8.9		9.1	17.1	18.0
Green Ext Time (p_c), s		0.3	0.0	2.5		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	36.4
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	86	378	143	43	748	257	127	74	41	316	155	223
Future Volume (veh/h)	86	378	143	43	748	257	127	74	41	316	155	223
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	93	411	155	47	813	279	109	121	45	256	290	242
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	638	238	132	894	400	422	443	376	422	443	376
Arrive On Green	0.07	0.24	0.24	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	2626	979	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	93	287	279	47	813	279	109	121	45	256	290	242
Grp Sat Flow(s),veh/h/ln	1845	1840	1764	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.5	9.8	10.0	1.7	15.0	10.8	3.4	3.6	1.5	8.7	9.5	9.3
Cycle Q Clear(g_c), s	3.5	9.8	10.0	1.7	15.0	10.8	3.4	3.6	1.5	8.7	9.5	9.3
Prop In Lane	1.00		0.56	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	447	429	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.71	0.64	0.65	0.36	0.91	0.70	0.26	0.27	0.12	0.61	0.65	0.64
Avail Cap(c_a), veh/h	132	447	429	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.8	23.8	23.8	31.0	25.8	24.2	22.1	22.2	21.4	24.2	24.5	24.4
Incr Delay (d2), s/veh	27.2	6.9	7.5	7.4	14.8	9.7	1.5	1.5	0.6	6.4	7.4	8.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.8	5.8	5.7	1.1	9.4	6.0	1.9	2.1	0.8	5.2	6.0	5.1
LnGrp Delay(d),s/veh	59.0	30.7	31.3	38.4	40.6	33.9	23.6	23.7	22.1	30.5	31.9	32.6
LnGrp LOS	E	C	C	D	D	C	C	C	C	C	C	C
Approach Vol, veh/h		659			1139			275			788	
Approach Delay, s/veh		34.9			38.8			23.4			31.7	
Approach LOS		C			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		5.6	3.7	12.0		11.5	5.5	17.0
Green Ext Time (p_c), s		0.8	0.0	1.6		1.5	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	34.5
HCM 2010 LOS	C

Notes

Intersection	
Intersection Delay, s/veh	9.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	43	93	13	62	70	165	3	84	22	0	0	0
Future Vol, veh/h	43	93	13	62	70	165	3	84	22	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	47	101	14	67	76	179	3	91	24	0	0	0
Number of Lanes	0	1	1	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	2	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	2
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	9.2	9.9	8.9
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1
Vol Left, %	3%	32%	0%	21%
Vol Thru, %	77%	68%	0%	24%
Vol Right, %	20%	0%	100%	56%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	109	136	13	297
LT Vol	3	43	0	62
Through Vol	84	93	0	70
RT Vol	22	0	13	165
Lane Flow Rate	118	148	14	323
Geometry Grp	2	7	7	5
Degree of Util (X)	0.161	0.215	0.017	0.38
Departure Headway (Hd)	4.899	5.232	4.368	4.241
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	731	686	819	849
Service Time	2.936	2.962	2.098	2.265
HCM Lane V/C Ratio	0.161	0.216	0.017	0.38
HCM Control Delay	8.9	9.4	7.2	9.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.8	0.1	1.8

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	207	267	163	83	0	0	0	0	40	0	133
Future Vol, veh/h	0	207	267	163	83	0	0	0	0	40	0	133
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	225	290	177	90	0	0	0	0	43	0	145

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	225	0	0			669	669	90
Stage 1	-	-	-	-	-	-			444	444	-
Stage 2	-	-	-	-	-	-			225	225	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1344	-	0			423	379	968
Stage 1	0	-	-	-	-	0			646	575	-
Stage 2	0	-	-	-	-	0			812	718	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1344	-	-			364	0	968
Mov Cap-2 Maneuver	-	-	-	-	-	-			364	0	-
Stage 1	-	-	-	-	-	-			556	0	-
Stage 2	-	-	-	-	-	-			812	0	-

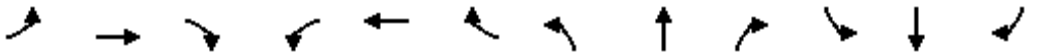
Approach	EB	WB	SB
HCM Control Delay, s	0	5.4	11
HCM LOS			B

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1344	-	364	968
HCM Lane V/C Ratio	-	-	0.132	-	0.119	0.149
HCM Control Delay (s)	-	-	8.1	0	16.2	9.4
HCM Lane LOS	-	-	A	A	C	A
HCM 95th %tile Q(veh)	-	-	0.5	-	0.4	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	294	119	1739	698	10	1652
Future Volume (veh/h)	294	119	1739	698	10	1652
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	320	0	1890	759	11	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	404	181	1844	1264	469	736
Arrive On Green	0.11	0.00	0.54	0.68	0.26	0.00
Sat Flow, veh/h	3632	1583	3442	1863	1774	2787
Grp Volume(v), veh/h	320	0	1890	759	11	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1863	1774	1393
Q Serve(g_s), s	12.3	0.0	75.0	30.9	0.6	0.0
Cycle Q Clear(g_c), s	12.3	0.0	75.0	30.9	0.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	404	181	1844	1264	469	736
V/C Ratio(X)	0.79	0.00	1.03	0.60	0.02	0.00
Avail Cap(c_a), veh/h	404	181	1844	1264	469	736
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.4	0.0	32.5	12.2	38.1	0.0
Incr Delay (d2), s/veh	14.6	0.0	27.6	2.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	0.0	42.4	16.6	0.3	0.0
LnGrp Delay(d),s/veh	75.0	0.0	60.1	14.3	38.2	0.0
LnGrp LOS	E		F	B	D	
Approach Vol, veh/h	320			2649	11	
Approach Delay, s/veh	75.0			47.0	38.2	
Approach LOS	E			D	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		41.0	79.0	20.0				99.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		37.0	75.0	16.0				95.0
Max Q Clear Time (g_c+I1), s		2.6	77.0	14.3				32.9
Green Ext Time (p_c), s		0.0	0.0	0.3				6.9

Intersection Summary	
HCM 2010 Ctrl Delay	50.0
HCM 2010 LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	258	103	163	362	295	1429	180	29	136	103	57	74
Future Volume (vph)	258	103	163	362	295	1429	180	29	136	103	57	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3030	1441		1786	1583		1805	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3030	1441		1786	1583		1805	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	280	112	177	393	321	1553	196	32	148	112	62	80
RTOR Reduction (vph)	0	0	150	0	500	573	0	0	114	0	0	65
Lane Group Flow (vph)	280	112	27	393	598	203	0	228	34	0	174	15
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	14.0	13.3	13.3	17.0	19.9	19.9		20.2	20.2		16.0	16.0
Effective Green, g (s)	14.0	13.3	13.3	17.0	19.9	19.9		20.2	20.2		16.0	16.0
Actuated g/C Ratio	0.16	0.15	0.15	0.19	0.23	0.23		0.23	0.23		0.18	0.18
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	283	283	241	344	690	328		413	366		330	290
v/s Ratio Prot	0.16	0.06		c0.22	c0.20			c0.13			c0.10	
v/s Ratio Perm			0.02			0.14			0.02			0.01
v/c Ratio	0.99	0.40	0.11	1.14	0.87	0.62		0.55	0.09		0.53	0.05
Uniform Delay, d1	36.6	33.4	31.9	35.1	32.4	30.3		29.6	26.4		32.2	29.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	50.0	0.3	0.1	93.0	10.7	2.4		5.2	0.5		5.9	0.3
Delay (s)	86.6	33.7	32.0	128.2	43.1	32.7		34.8	26.9		38.2	29.7
Level of Service	F	C	C	F	D	C		C	C		D	C
Approach Delay (s)		59.2			54.3			31.7			35.5	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	51.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	87.3	Sum of lost time (s)	20.8
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2013
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	5	0	526	0	205	0	5	280	536	0	353	359	2
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	6	0	583	0	223	0	6	310	594	0	391	398	2
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		6		0	583	223		316	594	391	400	
Entry Volume veh/h		6		0	572	223		310	582	383	392	
Circulating Flow (Vc), pc/h	1372			316			391			589		
Exiting Flow (Vex), pc/h	391			8			310			987		
Capacity (cPCE), pc/h		287		892	906			859		726	748	
Capacity (c), veh/h		281		874	888			843		712	734	
v/c Ratio (X)		0.02		0.00	0.64			0.37		0.54	0.53	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		13.2		4.1	14.3	0.0		8.6	0.0	13.5	13.1	
Lane LOS		B		A	B	A		A	A	B	B	
95% Queue		0.1		0.0	4.8			1.7		3.2	3.2	
Approach Delay, s/veh	13.2			10.3			3.0			13.3		
Approach LOS	B			B			A			B		
Intersection Delay, s/veh / LOS	8.6						A					

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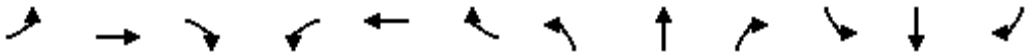
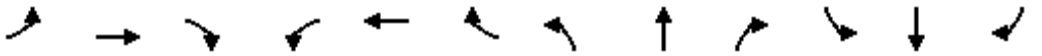


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	38	26	62	65	100	41	78	65	115	106	25
Future Volume (vph)	1	38	26	62	65	100	41	78	65	115	106	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	41	28	67	71	109	45	85	71	125	115	27

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	70	247	201	267
Volume Left (vph)	1	67	45	125
Volume Right (vph)	28	109	71	27
Hadj (s)	-0.20	-0.18	-0.13	0.07
Departure Headway (s)	5.3	5.0	5.0	5.1
Degree Utilization, x	0.10	0.35	0.28	0.38
Capacity (veh/h)	592	658	668	662
Control Delay (s)	8.9	10.7	9.9	11.2
Approach Delay (s)	8.9	10.7	9.9	11.2
Approach LOS	A	B	A	B

Intersection Summary				
Delay	10.5			
Level of Service	B			
Intersection Capacity Utilization	52.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	162	50	68	11	44	27	48	554	17	43	560	117
Future Volume (vph)	162	50	68	11	44	27	48	554	17	43	560	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	2.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1794	1583		1769		1770	1855		1770	1863	1583
Flt Permitted		0.76	1.00		0.96		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1419	1583		1717		1770	1855		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	176	54	74	12	48	29	52	602	18	47	609	127
RTOR Reduction (vph)	0	0	53	0	21	0	0	1	0	0	0	58
Lane Group Flow (vph)	0	230	21	0	68	0	52	619	0	47	609	69
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								6
Actuated Green, G (s)		19.0	19.0		19.0		5.7	27.7		10.1	36.9	36.9
Effective Green, g (s)		19.0	19.0		19.0		5.7	27.7		10.1	36.9	36.9
Actuated g/C Ratio		0.28	0.28		0.28		0.08	0.41		0.15	0.55	0.55
Clearance Time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	2.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		3.0	7.0	7.0
Lane Grp Cap (vph)		398	444		482		149	760		264	1016	864
v/s Ratio Prot							c0.03	c0.33		0.03	c0.33	
v/s Ratio Perm		c0.16	0.01		0.04							0.04
v/c Ratio		0.58	0.05		0.14		0.35	0.81		0.18	0.60	0.08
Uniform Delay, d1		20.9	17.7		18.2		29.2	17.7		25.1	10.4	7.3
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		4.8	0.2		0.5		1.4	6.7		0.3	2.1	0.1
Delay (s)		25.7	17.9		18.7		30.6	24.4		25.4	12.5	7.4
Level of Service		C	B		B		C	C		C	B	A
Approach Delay (s)		23.8			18.7			24.8			12.4	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	67.6	Sum of lost time (s)	10.8
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	26	29	23	0	29	34	65	0	19	548	53	0	36	572	22
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	29	32	26	0	32	38	72	0	21	608	59	0	40	634	24
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		87			142			688			698	
Entry Volume veh/h		85			139			675			684	
Circulating Flow (Vc), pc/h	706			658			101			91		
Exiting Flow (Vex), pc/h	131			83			709			692		
Capacity (cPCE), pc/h		558			585			1021			1032	
Capacity (c), veh/h		547			574			1001			1011	
v/c Ratio (X)		0.16			0.24			0.67			0.68	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.6			9.5			14.0			14.0	
Lane LOS		A			A			B			B	
95% Queue		0.5			0.9			5.5			5.5	
Approach Delay, s/veh	8.6			9.5			14.0			14.0		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	13.3						B					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/12/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	38	30	42	0	18	30	51	0	32	531	42	0	23	531	72
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	42	33	47	0	20	33	57	0	35	589	47	0	26	589	80
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		122			110			671			695	
Entry Volume veh/h		120			108			658			681	
Circulating Flow (Vc), pc/h	635			666			101			88		
Exiting Flow (Vex), pc/h	106			148			688			656		
Capacity (cPCE), pc/h		599			581			1021			1035	
Capacity (c), veh/h		587			569			1001			1015	
v/c Ratio (X)		0.20			0.19			0.66			0.67	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.7			8.7			13.5			13.8	
Lane LOS		A			A			B			B	
95% Queue		0.8			0.7			5.1			5.4	
Approach Delay, s/veh	8.7			8.7			13.5			13.8		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	12.9						B					

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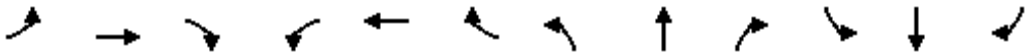


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	32	13	116	107	13	18	40	250	50	18	225	10
Future Volume (vph)	32	13	116	107	13	18	40	250	50	18	225	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	14	126	116	14	20	43	272	54	20	245	11

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	49	126	150	179	190	143	134
Volume Left (vph)	35	0	116	43	0	20	0
Volume Right (vph)	0	126	20	0	54	0	11
Hadj (s)	0.39	-0.67	0.11	0.15	-0.16	0.10	-0.02
Departure Headway (s)	6.8	5.8	6.5	6.1	5.7	6.1	6.0
Degree Utilization, x	0.09	0.20	0.27	0.30	0.30	0.24	0.22
Capacity (veh/h)	485	571	515	570	600	555	568
Control Delay (s)	9.3	9.0	11.9	10.5	10.0	9.9	9.5
Approach Delay (s)	9.1		11.9	10.2		9.7	
Approach LOS	A		B	B		A	

Intersection Summary				
Delay	10.1			
Level of Service	B			
Intersection Capacity Utilization	41.1%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	181	81	106	126	59	124
Future Volume (vph)	181	81	106	126	59	124
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	197	88	115	137	64	135

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	197	88	252	199
Volume Left (vph)	197	0	0	64
Volume Right (vph)	0	88	137	0
Hadj (s)	0.53	-0.67	-0.29	0.10
Departure Headway (s)	6.1	4.9	4.7	5.1
Degree Utilization, x	0.34	0.12	0.33	0.28
Capacity (veh/h)	555	684	732	665
Control Delay (s)	11.0	7.4	9.9	10.1
Approach Delay (s)	9.9		9.9	10.1
Approach LOS	A		A	B

Intersection Summary			
Delay	10.0		
Level of Service	A		
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

Existing Year 2013 No Project

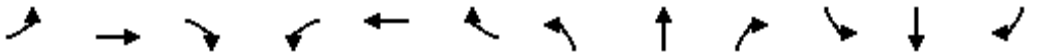
Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #9 Cleveland Street and Mission Avenue

Cycle (sec):	100	Critical Vol./Cap.(X):	0.292
Loss Time (sec):	0	Average Delay (sec/veh):	10.6
Optimal Cycle:	0	Level Of Service:	B

Street Name:	Cleveland Street						Mission Avenue					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	0	0 1	0	0 1!	0 0	1	0 1	1 0	1	0 1	1 0
Volume Module:												
Base Vol:	43	38	58	72	29	59	28	224	33	93	204	63
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	43	38	58	72	29	59	28	224	33	93	204	63
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	43	38	58	72	29	59	28	224	33	93	204	63
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	43	38	58	72	29	59	28	224	33	93	204	63
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	43	38	58	72	29	59	28	224	33	93	204	63
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.53	0.47	1.00	0.45	0.18	0.37	1.00	1.74	0.26	1.00	1.53	0.47
Final Sat.:	268	237	584	247	99	202	504	961	144	519	872	279
Capacity Analysis Module:												
Vol/Sat:	0.16	0.16	0.10	0.29	0.29	0.29	0.06	0.23	0.23	0.18	0.23	0.23
Crit Moves:	****			****			****			****		
Delay/Veh:	10.6	10.6	9.0	11.6	11.6	11.6	9.9	10.7	10.5	10.7	10.5	10.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	10.6	10.6	9.0	11.6	11.6	11.6	9.9	10.7	10.5	10.7	10.5	10.1
LOS by Move:	B	B	A	B	B	B	A	B	B	B	B	B
ApproachDel:	9.9			11.6			10.6			10.5		
Delay Adj:	1.00			1.00			1.00			1.00		
ApprAdjDel:	9.9			11.6			10.6			10.5		
LOS by Appr:	A			B			B			B		
AllWayAvgQ:	0.2	0.2	0.1	0.4	0.4	0.4	0.1	0.3	0.3	0.2	0.3	0.3

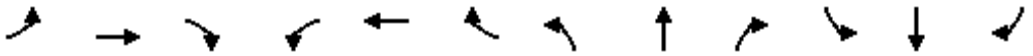
Note: Queue reported is the number of cars per lane.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	0	65	137	380	121	53	507	0	0	426	61
Future Volume (vph)	43	0	65	137	380	121	53	507	0	0	426	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	0.95		1.00	1.00			0.95	0.95
Frpb, ped/bikes	1.00		0.96	1.00	0.99		1.00	1.00			1.00	0.97
Flpb, ped/bikes	0.99		1.00	0.98	1.00		1.00	1.00			1.00	1.00
Frt	1.00		0.85	1.00	0.96		1.00	1.00			1.00	0.85
Flt Protected	0.95		1.00	0.95	1.00		0.95	1.00			1.00	1.00
Satd. Flow (prot)	1756		1522	1737	3381		1770	1863			1765	1461
Flt Permitted	0.42		1.00	0.95	1.00		0.32	1.00			1.00	1.00
Satd. Flow (perm)	779		1522	1737	3381		589	1863			1765	1461
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	0	71	149	413	132	58	551	0	0	463	66
RTOR Reduction (vph)	0	0	41	0	44	0	0	0	0	0	1	31
Lane Group Flow (vph)	47	0	30	149	501	0	58	551	0	0	469	28
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type	Perm		Perm	Perm	NA		Perm	NA			NA	Perm
Protected Phases					8			2			6	
Permitted Phases	4		4	8			2					6
Actuated Green, G (s)	25.5		25.5	25.5	25.5		24.5	24.5			24.5	24.5
Effective Green, g (s)	25.5		25.5	25.5	25.5		24.5	24.5			24.5	24.5
Actuated g/C Ratio	0.42		0.42	0.42	0.42		0.41	0.41			0.41	0.41
Clearance Time (s)	5.0		5.0	5.0	5.0		5.0	5.0			5.0	5.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0		4.0	4.0			4.0	4.0
Lane Grp Cap (vph)	331		646	738	1436		240	760			720	596
v/s Ratio Prot					c0.15			c0.30			0.27	
v/s Ratio Perm	0.06		0.02	0.09			0.10					0.02
v/c Ratio	0.14		0.05	0.20	0.35		0.24	0.72			0.65	0.05
Uniform Delay, d1	10.6		10.1	10.8	11.6		11.7	14.9			14.3	10.7
Progression Factor	1.00		1.00	1.00	1.00		0.20	0.21			1.36	2.11
Incremental Delay, d2	0.9		0.1	0.6	0.7		0.3	1.8			1.8	0.0
Delay (s)	11.5		10.3	11.5	12.3		2.7	4.8			21.4	22.7
Level of Service	B		B	B	B		A	A			C	C
Approach Delay (s)		10.7			12.1			4.6			21.5	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	12.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	351	3	142	638	268	5	44	477	365	51	25
Future Volume (vph)	15	351	3	142	638	268	5	44	477	365	51	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.86		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	0.97	
Satd. Flow (prot)	1770	3535		1770	3539	1583	1770	1607		1681	1684	
Flt Permitted	0.28	1.00		0.51	1.00	1.00	0.60	1.00		0.32	0.42	
Satd. Flow (perm)	529	3535		951	3539	1583	1116	1607		575	736	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	382	3	154	693	291	5	48	518	397	55	27
RTOR Reduction (vph)	0	1	0	0	0	197	0	145	0	0	7	0
Lane Group Flow (vph)	16	384	0	154	693	94	5	421	0	238	234	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)	19.8	19.8		19.4	19.4	19.4	31.0	31.0		31.0	31.0	
Effective Green, g (s)	19.8	19.8		19.4	19.4	19.4	31.0	31.0		31.0	31.0	
Actuated g/C Ratio	0.33	0.33		0.32	0.32	0.32	0.52	0.52		0.52	0.52	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0	4.6	4.6		4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5	4.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	174	1166		307	1144	511	576	830		297	380	
v/s Ratio Prot		0.11			c0.20			0.26				
v/s Ratio Perm	0.03			0.16		0.06	0.00			c0.41	0.32	
v/c Ratio	0.09	0.33		0.50	0.61	0.18	0.01	0.51		0.80	0.62	
Uniform Delay, d1	13.9	15.1		16.4	17.1	14.6	7.0	9.5		12.0	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.2		1.5	1.0	0.2	0.0	2.2		20.0	7.3	
Delay (s)	14.2	15.3		17.9	18.0	14.8	7.1	11.7		31.9	17.6	
Level of Service	B	B		B	B	B	A	B		C	B	
Approach Delay (s)		15.3			17.2			11.7			24.7	
Approach LOS		B			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

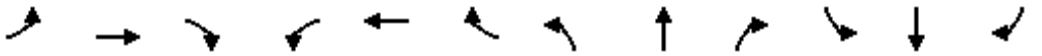
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	177	32	50	126	50	63
Future Volume (Veh/h)	177	32	50	126	50	63
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	192	35	54	137	54	68
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			227		454	210
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			227		454	210
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		90	92
cM capacity (veh/h)			1341		541	831

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	227	191	122
Volume Left	0	54	54
Volume Right	35	0	68
cSH	1700	1341	671
Volume to Capacity	0.13	0.04	0.18
Queue Length 95th (ft)	0	3	16
Control Delay (s)	0.0	2.4	11.5
Lane LOS		A	B
Approach Delay (s)	0.0	2.4	11.5
Approach LOS			B

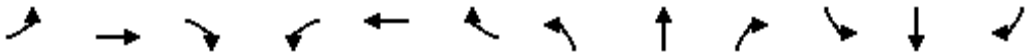
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	365	67	0	0	0	58	651	245	113	479	62
Future Volume (vph)	70	365	67	0	0	0	58	651	245	113	479	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Lane Util. Factor	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99					1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00					1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98					1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1803					1770	1863	1552	1770	1863	1515
Flt Permitted	0.95	1.00					0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1803					1770	1863	1552	1770	1863	1515
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	397	73	0	0	0	63	708	266	123	521	67
RTOR Reduction (vph)	0	11	0	0	0	0	0	0	94	0	0	40
Lane Group Flow (vph)	76	459	0	0	0	0	63	708	172	123	521	27
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA	Perm	Prot	NA	Perm
Protected Phases	4	4					5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	18.0	18.0					4.4	23.7	23.7	5.3	24.6	24.6
Effective Green, g (s)	18.0	18.0					4.4	23.7	23.7	5.3	24.6	24.6
Actuated g/C Ratio	0.30	0.30					0.07	0.39	0.39	0.09	0.41	0.41
Clearance Time (s)	4.2	4.2					4.2	4.6	4.6	4.2	4.6	4.6
Vehicle Extension (s)	3.0	3.0					3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	531	540					129	735	613	156	763	621
v/s Ratio Prot	0.04	c0.25					0.04	c0.38		0.07	c0.28	
v/s Ratio Perm									0.11			0.02
v/c Ratio	0.14	0.85					0.49	0.96	0.28	0.79	0.68	0.04
Uniform Delay, d1	15.4	19.7					26.7	17.7	12.4	26.8	14.5	10.6
Progression Factor	1.00	1.00					0.95	0.85	0.58	0.74	0.53	0.72
Incremental Delay, d2	0.6	15.4					10.9	23.1	1.0	30.4	4.6	0.1
Delay (s)	15.9	35.1					36.3	38.2	8.1	50.4	12.2	7.8
Level of Service	B	D					D	D	A	D	B	A
Approach Delay (s)		32.4			0.0			30.3			18.4	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

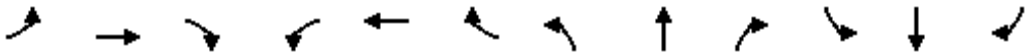
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	677	14	0	0	0	0	8	33	24	18	0
Future Volume (Veh/h)	15	677	14	0	0	0	0	8	33	24	18	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	736	15	0	0	0	0	9	36	26	20	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			751			786	776	376	440	783	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			751			786	776	376	440	783	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	94	94	100
cM capacity (veh/h)	1622			854			267	324	622	458	321	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	384	383	45	46
Volume Left	16	0	0	26
Volume Right	0	15	36	0
cSH	1622	1700	525	386
Volume to Capacity	0.01	0.23	0.09	0.12
Queue Length 95th (ft)	1	0	7	10
Control Delay (s)	0.4	0.0	12.5	15.6
Lane LOS	A		B	C
Approach Delay (s)	0.2		12.5	15.6
Approach LOS			B	C

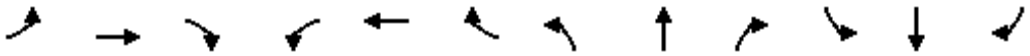
Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	35.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	26	692	16	0	0	0	0	20	34	33	42	0
Future Volume (vph)	26	692	16	0	0	0	0	20	34	33	42	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	752	17	0	0	0	0	22	37	36	46	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	404	393	59	82
Volume Left (vph)	28	0	0	36
Volume Right (vph)	0	17	37	0
Hadj (s)	0.07	0.00	-0.34	0.12
Departure Headway (s)	5.0	4.9	5.2	5.6
Degree Utilization, x	0.56	0.54	0.09	0.13
Capacity (veh/h)	708	724	646	598
Control Delay (s)	12.9	12.2	8.7	9.5
Approach Delay (s)	12.5		8.7	9.5
Approach LOS	B		A	A

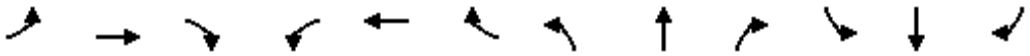
Intersection Summary				
Delay	12.0			
Level of Service	B			
Intersection Capacity Utilization	37.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	377	405	19	6	0	4	0	7	7	0	0	0
Future Volume (vph)	377	405	19	6	0	4	0	7	7	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	410	440	21	7	0	4	0	8	8	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	410	461	11	16
Volume Left (vph)	410	0	7	0
Volume Right (vph)	0	21	4	8
Hadj (s)	0.53	0.00	-0.06	-0.27
Departure Headway (s)	5.1	4.6	4.7	5.2
Degree Utilization, x	0.58	0.58	0.01	0.02
Capacity (veh/h)	704	785	753	652
Control Delay (s)	13.7	12.5	7.7	8.3
Approach Delay (s)	13.1		7.7	8.3
Approach LOS	B		A	A

Intersection Summary				
Delay	12.9			
Level of Service	B			
Intersection Capacity Utilization	37.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	37	0	0	11	16	644	16	8	589	17
Future Volume (Veh/h)	0	0	37	0	0	11	16	644	16	8	589	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	40	0	0	12	17	700	17	9	640	18
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			440	
pX, platoon unblocked	0.87	0.87	0.78	0.87	0.87	0.83	0.78			0.83		
vC, conflicting volume	1421	1432	656	1448	1432	716	665			724		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	967	980	422	998	981	556	434			565		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	97	98			99		
cM capacity (veh/h)	190	208	492	171	208	437	877			831		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	40	12	17	717	9	658
Volume Left	0	0	17	0	9	0
Volume Right	40	12	0	17	0	18
cSH	492	437	877	1700	831	1700
Volume to Capacity	0.08	0.03	0.02	0.42	0.01	0.39
Queue Length 95th (ft)	7	2	1	0	1	0
Control Delay (s)	13.0	13.5	9.2	0.0	9.4	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.0	13.5	0.2		0.1	
Approach LOS	B	B				

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	45.2%	ICU Level of Service		A
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	4	0	20	0	21	5	9	0	13	665	14	0	18	604	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	4	0	22	0	23	6	10	0	14	737	16	0	20	670	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		26			39			767			709	
Entry Volume veh/h		25			38			752			695	
Circulating Flow (Vc), pc/h	713			755			24			43		
Exiting Flow (Vex), pc/h	36			39			751			715		
Capacity (cPCE), pc/h		554			531			1103			1082	
Capacity (c), veh/h		543			521			1082			1061	
v/c Ratio (X)		0.05			0.07			0.70			0.65	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.2			7.8			14.0			12.9	
Lane LOS		A			A			B			B	
95% Queue		0.1			0.2			6.0			5.1	
Approach Delay, s/veh	7.2			7.8			14.0			12.9		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	13.2						B					

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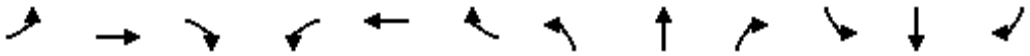
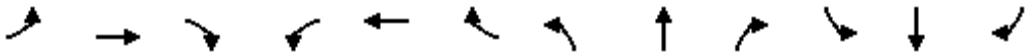


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	57	85	49	45	7	58	7	130	36	69	80	3
Future Volume (vph)	57	85	49	45	7	58	7	130	36	69	80	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	92	53	49	8	63	8	141	39	75	87	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	207	120	188	165
Volume Left (vph)	62	49	8	75
Volume Right (vph)	53	63	39	3
Hadj (s)	-0.06	-0.20	-0.08	0.11
Departure Headway (s)	4.9	4.9	4.9	5.1
Degree Utilization, x	0.28	0.16	0.26	0.23
Capacity (veh/h)	679	666	684	651
Control Delay (s)	9.8	8.9	9.5	9.7
Approach Delay (s)	9.8	8.9	9.5	9.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.5			
Level of Service	A			
Intersection Capacity Utilization	40.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	207	20	9	144	24	19	33	31	19	44	9
Future Volume (Veh/h)	8	207	20	9	144	24	19	33	31	19	44	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	225	22	10	157	26	21	36	34	21	48	10
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	197			254			486	478	243	510	476	185
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	197			254			486	478	243	510	476	185
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			95	92	96	95	90	99
cM capacity (veh/h)	1360			1303			435	471	791	412	472	847

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	256	193	91	79
Volume Left	9	10	21	21
Volume Right	22	26	34	10
cSH	1360	1303	543	481
Volume to Capacity	0.01	0.01	0.17	0.16
Queue Length 95th (ft)	0	1	15	15
Control Delay (s)	0.3	0.5	13.0	14.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.5	13.0	14.0
Approach LOS			B	B

Intersection Summary				
Average Delay	4.0			
Intersection Capacity Utilization	27.4%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	69	61	123	0	57	49	10	0	108	582	62	0	11	582	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	76	68	136	0	63	54	11	0	120	645	69	0	12	645	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		280			128			834			695	
Entry Volume veh/h		275			125			818			681	
Circulating Flow (Vc), pc/h		720			841			156			237	
Exiting Flow (Vex), pc/h		149			212			732			844	
Capacity (cPCE), pc/h		550			487			967			892	
Capacity (c), veh/h		539			478			948			874	
v/c Ratio (X)		0.51			0.26			0.86			0.78	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		15.9			11.5			26.5			20.9	
Lane LOS		C			B			D			C	
95% Queue		2.9			1.0			11.2			8.0	
Approach Delay, s/veh	15.9			11.5			26.5			20.9		
Approach LOS	C			B			D			C		
Intersection Delay, s/veh / LOS	22.0						C					

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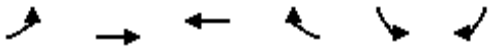
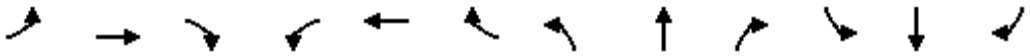


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	125	93	14	21	22
Future Volume (Veh/h)	5	125	93	14	21	22
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	136	101	15	23	24
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	124				264	118
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	124				264	118
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	97
cM capacity (veh/h)	1453				718	927

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	141	116	47
Volume Left	5	0	23
Volume Right	0	15	24
cSH	1453	1700	811
Volume to Capacity	0.00	0.07	0.06
Queue Length 95th (ft)	0	0	5
Control Delay (s)	0.3	0.0	9.7
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	9.7
Approach LOS			A

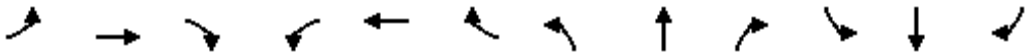
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	21.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	129	2	1	86	18	1	1	2	27	0	19
Future Volume (Veh/h)	14	129	2	1	86	18	1	1	2	27	0	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	140	2	1	93	20	1	1	2	29	0	21
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	115			142			299	288	141	280	279	107
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	115			142			299	288	141	280	279	107
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	96	100	98
cM capacity (veh/h)	1471			1441			632	614	907	662	621	944

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	157	114	4	50
Volume Left	15	1	1	29
Volume Right	2	20	2	21
cSH	1471	1441	738	757
Volume to Capacity	0.01	0.00	0.01	0.07
Queue Length 95th (ft)	1	0	0	5
Control Delay (s)	0.8	0.1	9.9	10.1
Lane LOS	A	A	A	B
Approach Delay (s)	0.8	0.1	9.9	10.1
Approach LOS			A	B

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	27.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	79	79	23	57	1	47	1	32	0	1	0
Future Volume (vph)	1	79	79	23	57	1	47	1	32	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	86	86	25	62	1	51	1	35	0	1	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	173	88	87	1
Volume Left (vph)	1	25	51	0
Volume Right (vph)	86	1	35	0
Hadj (s)	-0.26	0.08	-0.09	0.03
Departure Headway (s)	3.9	4.4	4.4	4.6
Degree Utilization, x	0.19	0.11	0.11	0.00
Capacity (veh/h)	890	802	775	723
Control Delay (s)	7.9	7.9	7.9	7.6
Approach Delay (s)	7.9	7.9	7.9	7.6
Approach LOS	A	A	A	A

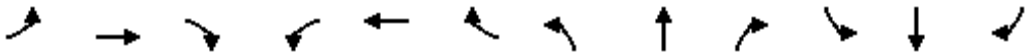
Intersection Summary				
Delay	7.9			
Level of Service	A			
Intersection Capacity Utilization	37.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	43	90	111	63	65	108
Future Volume (vph)	43	90	111	63	65	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	98	121	68	71	117

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	145	189	188
Volume Left (vph)	47	0	71
Volume Right (vph)	98	68	0
Hadj (s)	-0.31	-0.18	0.11
Departure Headway (s)	4.4	4.3	4.6
Degree Utilization, x	0.18	0.22	0.24
Capacity (veh/h)	747	805	753
Control Delay (s)	8.4	8.5	9.0
Approach Delay (s)	8.4	8.5	9.0
Approach LOS	A	A	A

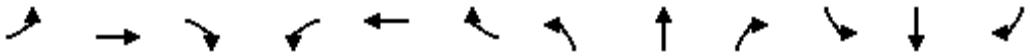
Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	201	18	19	166	42	25	31	37	46	19	12
Future Volume (Veh/h)	8	201	18	19	166	42	25	31	37	46	19	12
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	218	20	21	180	46	27	34	40	50	21	13
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.92						0.92	0.92		0.92	0.92	0.92
vC, conflicting volume	229			249			530	528	247	559	515	210
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	117			249			444	442	247	476	428	96
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			94	92	95	87	95	99
cM capacity (veh/h)	1349			1305			441	452	779	396	461	877

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	247	247	101	84
Volume Left	9	21	27	50
Volume Right	20	46	40	13
cSH	1349	1305	538	450
Volume to Capacity	0.01	0.02	0.19	0.19
Queue Length 95th (ft)	1	1	17	17
Control Delay (s)	0.3	0.8	13.2	14.8
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	13.2	14.8
Approach LOS			B	B

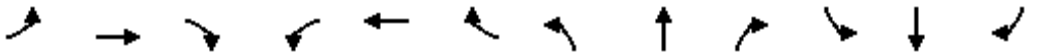
Intersection Summary				
Average Delay	4.2			
Intersection Capacity Utilization	35.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	160	60	263	155	235	63	618	169	242	525	21
Future Volume (vph)	40	160	60	263	155	235	63	618	169	242	525	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	0.93	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844	1532	1681	1746	1478	1770	3412		1770	1847	
Flt Permitted		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1844	1532	1681	1746	1478	1770	3412		1770	1847	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	174	65	286	168	255	68	672	184	263	571	23
RTOR Reduction (vph)	0	0	55	0	0	210	0	27	0	0	2	0
Lane Group Flow (vph)	0	217	10	223	231	45	68	829	0	263	592	0
Confl. Peds. (#/hr)	14		10	10		14			3			15
Confl. Bikes (#/hr)			4			5			3			3
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		14.4	14.4	15.9	15.9	15.9	5.8	25.2		15.7	35.1	
Effective Green, g (s)		14.4	14.4	15.9	15.9	15.9	5.8	25.2		15.7	35.1	
Actuated g/C Ratio		0.16	0.16	0.18	0.18	0.18	0.06	0.28		0.17	0.39	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.5		2.0	3.5	
Lane Grp Cap (vph)		295	245	296	308	261	114	955		308	720	
v/s Ratio Prot		c0.12		c0.13	0.13		0.04	0.24		c0.15	c0.32	
v/s Ratio Perm			0.01			0.03						
v/c Ratio		0.74	0.04	0.75	0.75	0.17	0.60	0.87		0.85	0.82	
Uniform Delay, d1		36.0	32.0	35.2	35.2	31.5	41.0	30.8		36.0	24.7	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.0	0.0	10.7	10.1	0.4	5.5	10.6		19.3	10.3	
Delay (s)		43.9	32.0	45.9	45.3	31.8	46.4	41.4		55.3	34.9	
Level of Service		D	C	D	D	C	D	D		E	C	
Approach Delay (s)		41.2			40.6			41.8			41.2	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		

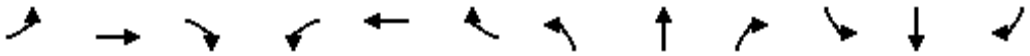
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	513	6	22	570	63	9	10	57	118	8	30
Future Volume (vph)	15	513	6	22	570	63	9	10	57	118	8	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3531		1764	3482			3091			1779	1544
Flt Permitted	0.39	1.00		0.44	1.00			0.90			0.73	1.00
Satd. Flow (perm)	727	3531		817	3482			2802			1359	1544
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	558	7	24	620	68	10	11	62	128	9	33
RTOR Reduction (vph)	0	2	0	0	13	0	0	50	0	0	0	27
Lane Group Flow (vph)	16	563	0	24	675	0	0	33	0	0	137	6
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	13.1	13.1		13.1	13.1			5.3			5.3	5.3
Effective Green, g (s)	13.1	13.1		13.1	13.1			5.3			5.3	5.3
Actuated g/C Ratio	0.47	0.47		0.47	0.47			0.19			0.19	0.19
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	341	1657		383	1634			532			258	293
v/s Ratio Prot		0.16			c0.19							
v/s Ratio Perm	0.02			0.03				0.01			c0.10	0.00
v/c Ratio	0.05	0.34		0.06	0.41			0.06			0.53	0.02
Uniform Delay, d1	4.0	4.7		4.0	4.9			9.3			10.2	9.2
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.1	0.1		0.1	0.2			0.1			2.7	0.0
Delay (s)	4.1	4.8		4.1	5.0			9.3			12.8	9.2
Level of Service	A	A		A	A			A			B	A
Approach Delay (s)		4.8			5.0			9.3			12.1	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	5.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	27.9	Sum of lost time (s)	9.5
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

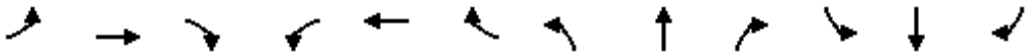
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	33	10	12	24	10	80	16	653	44	102	680	15
Future Volume (vph)	33	10	12	24	10	80	16	653	44	102	680	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1743			1797	1555	1770	3500		1770	3526	
Flt Permitted		0.79			0.75	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1427			1401	1555	1770	3500		1770	3526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	36	11	13	26	11	87	17	710	48	111	739	16
RTOR Reduction (vph)	0	11	0	0	0	76	0	6	0	0	2	0
Lane Group Flow (vph)	0	49	0	0	37	11	17	752	0	111	753	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		5.5			5.5	5.5	0.6	18.6		6.4	24.4	
Effective Green, g (s)		5.5			5.5	5.5	0.6	18.6		6.4	24.4	
Actuated g/C Ratio		0.12			0.12	0.12	0.01	0.42		0.14	0.55	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		177			174	193	24	1472		256	1946	
v/s Ratio Prot							0.01	c0.21		c0.06	0.21	
v/s Ratio Perm		c0.03			0.03	0.01						
v/c Ratio		0.27			0.21	0.06	0.71	0.51		0.43	0.39	
Uniform Delay, d1		17.5			17.4	17.1	21.7	9.4		17.2	5.6	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.2	0.0	65.6	0.3		1.2	0.1	
Delay (s)		17.8			17.6	17.1	87.3	9.7		18.4	5.8	
Level of Service		B			B	B	F	A		B	A	
Approach Delay (s)		17.8			17.3			11.4			7.4	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	44.2	Sum of lost time (s)	13.7
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

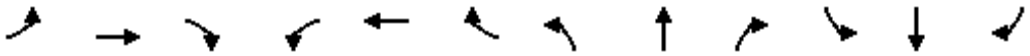
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	135	10	11	82	0	22	0	19	0	0	0
Future Volume (Veh/h)	2	135	10	11	82	0	22	0	19	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	147	11	12	89	0	24	0	21	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	89			158			270	270	152	290	275	89
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			158			270	270	152	290	275	89
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			96	100	98	100	100	100
cM capacity (veh/h)	1506			1422			678	631	894	641	626	969

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	160	101	45	0
Volume Left	2	12	24	0
Volume Right	11	0	21	0
cSH	1506	1422	764	1700
Volume to Capacity	0.00	0.01	0.06	0.00
Queue Length 95th (ft)	0	1	5	0
Control Delay (s)	0.1	1.0	10.0	0.0
Lane LOS	A	A	B	A
Approach Delay (s)	0.1	1.0	10.0	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	21.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	75	16	0	29	0	16	1	5	0	0	0
Future Volume (Veh/h)	0	75	16	0	29	0	16	1	5	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	82	17	0	32	0	17	1	5	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	32			99			122	122	90	128	131	32
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	32			99			122	122	90	128	131	32
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	100	99	100	100	100
cM capacity (veh/h)	1580			1494			852	768	967	840	760	1042

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	99	32	23	0
Volume Left	0	0	17	0
Volume Right	17	0	5	0
cSH	1580	1494	871	1700
Volume to Capacity	0.00	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	2	0
Control Delay (s)	0.0	0.0	9.2	0.0
Lane LOS			A	A
Approach Delay (s)	0.0	0.0	9.2	0.0
Approach LOS			A	A

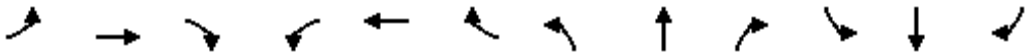
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	14.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	37	154	11	21	184	11
Future Volume (vph)	37	154	11	21	184	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	167	12	23	200	12

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	207	35	212
Volume Left (vph)	40	0	200
Volume Right (vph)	167	23	0
Hadj (s)	-0.41	-0.36	0.22
Departure Headway (s)	4.1	4.2	4.6
Degree Utilization, x	0.23	0.04	0.27
Capacity (veh/h)	830	791	742
Control Delay (s)	8.3	7.4	9.3
Approach Delay (s)	8.3	7.4	9.3
Approach LOS	A	A	A

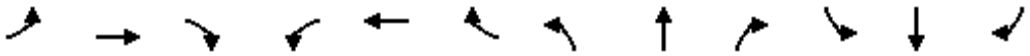
Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	35.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	203	61	9	159	10	83	11	12	3	8	15
Future Volume (Veh/h)	6	203	61	9	159	10	83	11	12	3	8	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	221	66	10	173	11	90	12	13	3	9	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	184			287			487	472	254	486	500	178
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	184			287			487	472	254	486	500	178
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			81	98	98	99	98	98
cM capacity (veh/h)	1391			1275			470	484	785	470	467	864

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	294	194	115	28
Volume Left	7	10	90	3
Volume Right	66	11	13	16
cSH	1391	1275	494	634
Volume to Capacity	0.01	0.01	0.23	0.04
Queue Length 95th (ft)	0	1	22	3
Control Delay (s)	0.2	0.5	14.5	10.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.5	14.5	10.9
Approach LOS			B	B

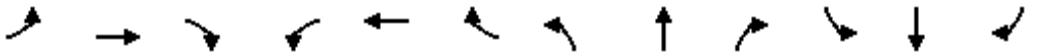
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	35.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	208	5	15	173	26	3	7	14	12	3	3
Future Volume (Veh/h)	3	208	5	15	173	26	3	7	14	12	3	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	226	5	16	188	28	3	8	15	13	3	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	216			231			473	482	228	488	471	202
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	216			231			473	482	228	488	471	202
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	98	98	97	99	100
cM capacity (veh/h)	1354			1337			492	477	811	470	484	839

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	234	232	26	19
Volume Left	3	16	3	13
Volume Right	5	28	15	3
cSH	1354	1337	628	508
Volume to Capacity	0.00	0.01	0.04	0.04
Queue Length 95th (ft)	0	1	3	3
Control Delay (s)	0.1	0.6	11.0	12.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.6	11.0	12.4
Approach LOS			B	B

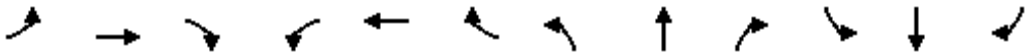
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	30.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	118	106	51	68	23	117	696	74	92	552	41
Future Volume (vph)	53	118	106	51	68	23	117	696	74	92	552	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.95			0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750			1790		1770	3488		1770	3502	
Flt Permitted		0.91			0.78		0.95	1.00		0.34	1.00	
Satd. Flow (perm)		1605			1422		1770	3488		627	3502	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	128	115	55	74	25	127	757	80	100	600	45
RTOR Reduction (vph)	0	28	0	0	9	0	0	12	0	0	7	0
Lane Group Flow (vph)	0	273	0	0	145	0	127	825	0	100	638	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		14.4			14.0		7.0	28.2		17.0	17.0	
Effective Green, g (s)		14.4			14.0		7.0	28.2		17.0	17.0	
Actuated g/C Ratio		0.28			0.27		0.13	0.54		0.33	0.33	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		442			381		237	1884		204	1140	
v/s Ratio Prot							0.07	c0.24			c0.18	
v/s Ratio Perm		c0.17			0.10					0.16		
v/c Ratio		0.62			0.38		0.54	0.44		0.49	0.56	
Uniform Delay, d1		16.5			15.6		21.1	7.2		14.1	14.5	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.6			0.8		1.2	0.2		1.9	0.6	
Delay (s)		19.1			16.3		22.3	7.4		16.0	15.1	
Level of Service		B			B		C	A		B	B	
Approach Delay (s)		19.1			16.3			9.3			15.2	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	52.2	Sum of lost time (s)	14.2
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

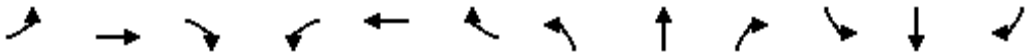
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	260	13	13	117	5	15	18	6	8	7	9
Future Volume (Veh/h)	9	260	13	13	117	5	15	18	6	8	7	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	283	14	14	127	5	16	20	7	9	8	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked				0.99			0.99	0.99	0.99	0.99	0.99	
vC, conflicting volume	132			297			482	470	290	484	474	130
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	132			289			475	463	282	478	468	130
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	96	99	98	98	99
cM capacity (veh/h)	1453			1264			479	484	752	468	481	920

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	307	146	43	27
Volume Left	10	14	16	9
Volume Right	14	5	7	10
cSH	1453	1264	511	578
Volume to Capacity	0.01	0.01	0.08	0.05
Queue Length 95th (ft)	1	1	7	4
Control Delay (s)	0.3	0.8	12.7	11.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	12.7	11.5
Approach LOS			B	B

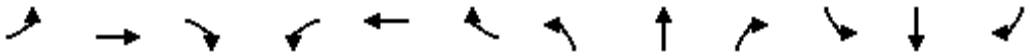
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	26.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	9	251	9	11	119	3	12	23	11	4	10	6
Future Volume (vph)	9	251	9	11	119	3	12	23	11	4	10	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	273	10	12	129	3	13	25	12	4	11	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	293	144	50	22
Volume Left (vph)	10	12	13	4
Volume Right (vph)	10	3	12	7
Hadj (s)	0.02	0.04	-0.06	-0.12
Departure Headway (s)	4.3	4.4	4.8	4.8
Degree Utilization, x	0.35	0.18	0.07	0.03
Capacity (veh/h)	828	781	677	670
Control Delay (s)	9.5	8.4	8.2	8.0
Approach Delay (s)	9.5	8.4	8.2	8.0
Approach LOS	A	A	A	A

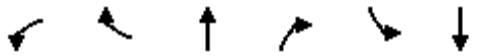
Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	26.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	17	267	16	68	115	33	16	80	154	63	17	4
Future Volume (vph)	17	267	16	68	115	33	16	80	154	63	17	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	290	17	74	125	36	17	87	167	68	18	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	325	235	271	90
Volume Left (vph)	18	74	17	68
Volume Right (vph)	17	36	167	4
Hadj (s)	0.01	0.01	-0.32	0.16
Departure Headway (s)	5.3	5.5	5.3	6.1
Degree Utilization, x	0.48	0.36	0.40	0.15
Capacity (veh/h)	634	610	622	509
Control Delay (s)	13.2	11.5	11.7	10.2
Approach Delay (s)	13.2	11.5	11.7	10.2
Approach LOS	B	B	B	B

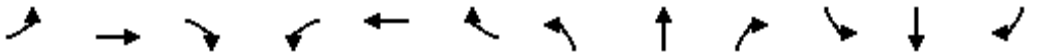
Intersection Summary				
Delay	12.0			
Level of Service	B			
Intersection Capacity Utilization	60.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	5	57	58	4	41	22
Future Volume (vph)	5	57	58	4	41	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	62	63	4	45	24

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	67	67	69
Volume Left (vph)	5	0	45
Volume Right (vph)	62	4	0
Hadj (s)	-0.51	0.00	0.16
Departure Headway (s)	3.7	4.1	4.3
Degree Utilization, x	0.07	0.08	0.08
Capacity (veh/h)	938	851	826
Control Delay (s)	7.0	7.4	7.6
Approach Delay (s)	7.0	7.4	7.6
Approach LOS	A	A	A

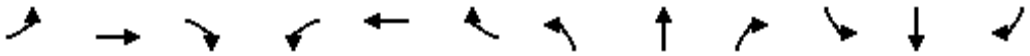
Intersection Summary			
Delay	7.3		
Level of Service	A		
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	103	33	203	82	350	37	569	269	293	478	18
Future Volume (vph)	15	103	33	203	82	350	37	569	269	293	478	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1553		1799	1583	1770	3331		1770	3514	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1553		1799	1583	1770	3331		1770	3514	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	112	36	221	89	380	40	618	292	318	520	20
RTOR Reduction (vph)	0	0	33	0	0	313	0	57	0	0	2	0
Lane Group Flow (vph)	16	112	3	0	310	67	40	853	0	318	538	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	Over	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	6.6	6.6	6.6		17.3	14.0	3.2	22.4		14.0	33.2	
Effective Green, g (s)	6.6	6.6	6.6		17.3	14.0	3.2	22.4		14.0	33.2	
Actuated g/C Ratio	0.08	0.08	0.08		0.22	0.18	0.04	0.28		0.18	0.42	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	147	154	129		391	279	71	939		312	1469	
v/s Ratio Prot	0.01	c0.06			c0.17	0.04	0.02	c0.26		c0.18	0.15	
v/s Ratio Perm			0.00									
v/c Ratio	0.11	0.73	0.02		0.79	0.24	0.56	0.91		1.02	0.37	
Uniform Delay, d1	33.7	35.5	33.4		29.4	28.1	37.4	27.5		32.7	15.9	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	13.5	0.0		10.5	0.2	6.0	12.3		55.9	0.2	
Delay (s)	33.8	49.0	33.5		39.9	28.3	43.4	39.8		88.6	16.0	
Level of Service	C	D	C		D	C	D	D		F	B	
Approach Delay (s)		44.1			33.5			39.9			42.9	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	79.4	Sum of lost time (s)	19.1
Intersection Capacity Utilization	74.7%	ICU Level of Service	D
Analysis Period (min)	15		

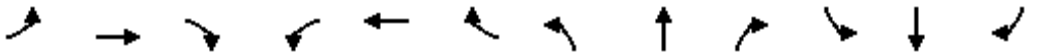
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	618	6	8	594	28	4	0	8	13	3	30
Future Volume (Veh/h)	5	618	6	8	594	28	4	0	8	13	3	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	672	7	9	646	30	4	0	9	14	3	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	676			679			1399	1380	676	1374	1368	661
vC1, stage 1 conf vol							686	686		679	679	
vC2, stage 2 conf vol							714	694		694	689	
vCu, unblocked vol	676			637			1394	1373	634	1367	1361	661
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	100	98	96	99	93
cM capacity (veh/h)	915			901			297	330	456	314	331	462

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	684	685	13	50
Volume Left	5	9	4	14
Volume Right	7	30	9	33
cSH	915	901	392	400
Volume to Capacity	0.01	0.01	0.03	0.13
Queue Length 95th (ft)	0	1	3	11
Control Delay (s)	0.1	0.3	14.5	15.3
Lane LOS	A	A	B	C
Approach Delay (s)	0.1	0.3	14.5	15.3
Approach LOS			B	C

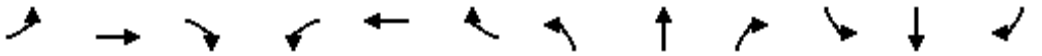
Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	48.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	730	5	12	718	33	1	1	19	13	1	8
Future Volume (Veh/h)	5	730	5	12	718	33	1	1	19	13	1	8
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	793	5	13	780	36	1	1	21	14	1	9
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.99			0.99	0.99	0.99	0.99	0.99	
vC, conflicting volume	816			799			1641	1648	796	1651	1633	799
vC1, stage 1 conf vol							806	806		824	824	
vC2, stage 2 conf vol							834	842		827	809	
vCu, unblocked vol	816			793			1642	1650	790	1652	1634	799
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			100	100	95	94	100	98
cM capacity (veh/h)	812			820			256	278	386	247	278	385

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	803	829	23	24
Volume Left	5	13	1	14
Volume Right	5	36	21	9
cSH	812	820	372	287
Volume to Capacity	0.01	0.02	0.06	0.08
Queue Length 95th (ft)	0	1	5	7
Control Delay (s)	0.2	0.4	15.3	18.7
Lane LOS	A	A	C	C
Approach Delay (s)	0.2	0.4	15.3	18.7
Approach LOS			C	C

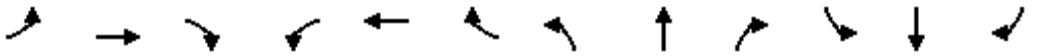
Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	61.5%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	722	0	9	743	205	0	0	5	3	0	11
Future Volume (Veh/h)	8	722	0	9	743	205	0	0	5	3	0	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	785	0	10	808	223	0	0	5	3	0	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1031			785			1643	1854	785	1748	1742	920
vC1, stage 1 conf vol							803	803		940	940	
vC2, stage 2 conf vol							840	1051		808	803	
vCu, unblocked vol	1031			785			1643	1854	785	1748	1742	920
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	99	99	100	96
cM capacity (veh/h)	674			834			253	237	393	237	260	329

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	794	10	1031	5	15
Volume Left	9	10	0	0	3
Volume Right	0	0	223	5	12
cSH	674	834	1700	393	305
Volume to Capacity	0.01	0.01	0.61	0.01	0.05
Queue Length 95th (ft)	1	1	0	1	4
Control Delay (s)	0.4	9.4	0.0	14.3	17.4
Lane LOS	A	A		B	C
Approach Delay (s)	0.4	0.1		14.3	17.4
Approach LOS				B	C

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	41	5	0	13	43	721	4	18	578	4
Future Volume (Veh/h)	0	0	41	5	0	13	43	721	4	18	578	4
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	45	5	0	14	47	784	4	20	628	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1170	1552	630	1593	1552	394	632			788		
vC1, stage 1 conf vol	670	670		880	880							
vC2, stage 2 conf vol	500	882		713	672							
vCu, unblocked vol	1170	1552	630	1593	1552	394	632			788		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	89	98	100	98	95			98		
cM capacity (veh/h)	324	273	424	210	273	605	947			827		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	45	19	47	523	265	20	632
Volume Left	0	5	47	0	0	20	0
Volume Right	45	14	0	0	4	0	4
cSH	424	405	947	1700	1700	827	1700
Volume to Capacity	0.11	0.05	0.05	0.31	0.16	0.02	0.37
Queue Length 95th (ft)	9	4	4	0	0	2	0
Control Delay (s)	14.5	14.3	9.0	0.0	0.0	9.5	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	14.5	14.3	0.5			0.3	
Approach LOS	B	B					

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	122	53	50	0	33	7	16	0	16	690	28	0	12	690	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	135	59	55	0	37	8	18	0	18	765	31	0	13	765	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		249			63			814			811	
Entry Volume veh/h		244			62			798			795	
Circulating Flow (Vc), pc/h	815			918			207			63		
Exiting Flow (Vex), pc/h	103			59			918			857		
Capacity (cPCE), pc/h		500			451			919			1061	
Capacity (c), veh/h		490			442			901			1040	
v/c Ratio (X)		0.50			0.14			0.89			0.76	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		16.9			10.2			30.2			17.5	
Lane LOS		C			B			D			C	
95% Queue		2.7			0.5			12.0			7.8	
Approach Delay, s/veh	16.9			10.2			30.2			17.5		
Approach LOS	C			B			D			C		
Intersection Delay, s/veh / LOS	22.5						C					

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	109	1	15	98	851	14	26	1778	129
Future Volume (veh/h)	0	0	0	109	1	15	98	851	14	26	1778	129
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h				119	0	0	107	925	0	28	1933	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				710	0	317	111	2988	930	111	2079	930
Arrive On Green				0.20	0.00	0.00	0.06	0.59	0.00	0.06	0.59	0.00
Sat Flow, veh/h				3548	0	1583	1774	5085	1583	1774	3539	1583
Grp Volume(v), veh/h				119	0	0	107	925	0	28	1933	0
Grp Sat Flow(s),veh/h/ln				1774	0	1583	1774	1695	1583	1774	1770	1583
Q Serve(g_s), s				2.2	0.0	0.0	4.8	7.3	0.0	1.2	39.7	0.0
Cycle Q Clear(g_c), s				2.2	0.0	0.0	4.8	7.3	0.0	1.2	39.7	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				710	0	317	111	2988	930	111	2079	930
V/C Ratio(X)				0.17	0.00	0.00	0.97	0.31	0.00	0.25	0.93	0.00
Avail Cap(c_a), veh/h				710	0	317	111	2988	930	111	2079	930
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				26.5	0.0	0.0	37.4	8.3	0.0	35.7	15.0	0.0
Incr Delay (d2), s/veh				0.5	0.0	0.0	76.5	0.3	0.0	5.4	8.9	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.0	4.7	3.5	0.0	0.8	21.6	0.0
LnGrp Delay(d),s/veh				27.0	0.0	0.0	113.9	8.6	0.0	41.1	23.9	0.0
LnGrp LOS				C			F	A		D	C	
Approach Vol, veh/h					119			1032			1961	
Approach Delay, s/veh					27.0			19.5			24.2	
Approach LOS					C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	9.0	51.0			9.0	51.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	5.0	47.0			5.0	47.0		16.0
Max Q Clear Time (g_c+I1), s	3.2	9.3			6.8	41.7		4.2
Green Ext Time (p_c), s	0.0	7.9			0.0	4.7		0.2

Intersection Summary		
HCM 2010 Ctrl Delay		22.7
HCM 2010 LOS		C

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	582	209	627	667	0	0
Future Volume (veh/h)	582	209	627	667	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	633	227	682	725		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1656	741	1253	3313		
Arrive On Green	0.45	0.45	0.35	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	633	227	682	725		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	4.6	3.5	6.1	1.0		
Cycle Q Clear(g_c), s	4.6	3.5	6.1	1.0		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1656	741	1253	3313		
V/C Ratio(X)	0.38	0.31	0.54	0.22		
Avail Cap(c_a), veh/h	1656	741	1253	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	7.3	7.0	10.4	0.2		
Incr Delay (d2), s/veh	0.7	1.1	1.7	0.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.4	1.8	3.2	0.5		
LnGrp Delay(d),s/veh	8.0	8.1	12.1	0.4		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	860			1407		
Approach Delay, s/veh	8.0			6.1		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			18.0	22.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			14.0	18.0				36.0
Max Q Clear Time (g_c+I1), s			8.1	6.6				3.0
Green Ext Time (p_c), s			1.5	4.0				5.8

Intersection Summary	
HCM 2010 Ctrl Delay	6.8
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1267	114	370	964	183	0
Future Volume (veh/h)	1267	114	370	964	183	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1377	124	402	1048	199	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1472	659	477	2208	492	439
Arrive On Green	0.40	0.40	0.13	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	1377	124	402	1048	199	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	21.5	2.9	6.6	9.6	5.3	0.0
Cycle Q Clear(g_c), s	21.5	2.9	6.6	9.6	5.3	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1472	659	477	2208	492	439
V/C Ratio(X)	0.94	0.19	0.84	0.47	0.40	0.00
Avail Cap(c_a), veh/h	1472	659	477	2208	492	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.3	11.7	25.4	6.7	18.1	0.0
Incr Delay (d2), s/veh	12.4	0.6	16.4	0.7	2.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.2	1.4	4.3	5.0	3.0	0.0
LnGrp Delay(d),s/veh	29.6	12.3	41.8	7.4	20.5	0.0
LnGrp LOS	C	B	D	A	C	
Approach Vol, veh/h	1501			1450	199	
Approach Delay, s/veh	28.2			17.0	20.5	
Approach LOS	C			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	12.0	28.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	8.0	24.0				36.0
Max Q Clear Time (g_c+I1), s		7.3	8.6	23.5				11.6
Green Ext Time (p_c), s		0.3	0.0	0.4				8.4

Intersection Summary	
HCM 2010 Ctrl Delay	22.5
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1094	10	163	1017	450	8	0	62	323	18	125
Future Volume (veh/h)	0	1094	10	163	1017	450	8	0	62	323	18	125
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	1189	11	177	1105	0	9	0	67	365	0	136
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1567	14	238	2256	1009	0	0	0	952	0	425
Arrive On Green	0.00	0.42	0.42	0.13	0.61	0.00	0.00	0.00	0.00	0.26	0.00	0.26
Sat Flow, veh/h	0	3834	35	1845	3681	1647		0		3690	0	1647
Grp Volume(v), veh/h	0	586	614	177	1105	0		0.0		365	0	136
Grp Sat Flow(s),veh/h/ln	0	1840	1931	1845	1840	1647				1845	0	1647
Q Serve(g_s), s	0.0	16.8	16.8	5.7	10.3	0.0				5.0	0.0	4.1
Cycle Q Clear(g_c), s	0.0	16.8	16.8	5.7	10.3	0.0				5.0	0.0	4.1
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	772	810	238	2256	1009				952	0	425
V/C Ratio(X)	0.00	0.76	0.76	0.74	0.49	0.00				0.38	0.00	0.32
Avail Cap(c_a), veh/h	0	772	810	238	2256	1009				952	0	425
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	15.3	15.3	26.0	6.6	0.0				18.9	0.0	18.6
Incr Delay (d2), s/veh	0.0	6.9	6.6	18.8	0.8	0.0				1.2	0.0	2.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	9.9	10.4	4.1	5.3	0.0				2.7	0.0	2.1
LnGrp Delay(d),s/veh	0.0	22.2	21.9	44.9	7.4	0.0				20.1	0.0	20.6
LnGrp LOS		C	C	D	A					C		C
Approach Vol, veh/h		1200			1282						501	
Approach Delay, s/veh		22.1			12.6						20.2	
Approach LOS		C			B						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	30.0		20.0		42.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	26.0		16.0		38.0
Max Q Clear Time (g_c+I1), s			7.7	18.8		7.0		12.3
Green Ext Time (p_c), s			0.0	4.3		1.3		9.2

Intersection Summary	
HCM 2010 Ctrl Delay	17.7
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	252	584	23	69	857	426	21	7	37	417	19	103
Future Volume (veh/h)	252	584	23	69	857	426	21	7	37	417	19	103
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	274	635	25	75	932	463	23	8	40	293	245	112
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	277	1038	41	185	874	391	295	102	350	369	252	115
Arrive On Green	0.15	0.29	0.29	0.10	0.24	0.24	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1845	3611	142	1845	3681	1647	1386	482	1647	1845	1260	576
Grp Volume(v), veh/h	274	323	337	75	932	463	31	0	40	293	0	357
Grp Sat Flow(s),veh/h/ln	1845	1840	1912	1845	1840	1647	1868	0	1647	1845	0	1836
Q Serve(g_s), s	11.9	12.2	12.2	3.1	19.0	19.0	1.1	0.0	1.6	12.1	0.0	15.5
Cycle Q Clear(g_c), s	11.9	12.2	12.2	3.1	19.0	19.0	1.1	0.0	1.6	12.1	0.0	15.5
Prop In Lane	1.00		0.07	1.00		1.00	0.74		1.00	1.00		0.31
Lane Grp Cap(c), veh/h	277	529	550	185	874	391	397	0	350	369	0	367
V/C Ratio(X)	0.99	0.61	0.61	0.41	1.07	1.18	0.08	0.00	0.11	0.79	0.00	0.97
Avail Cap(c_a), veh/h	277	529	550	185	874	391	397	0	350	369	0	367
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.9	24.6	24.6	33.8	30.5	30.5	25.2	0.0	25.4	30.4	0.0	31.8
Incr Delay (d2), s/veh	51.6	5.2	5.0	6.5	49.7	105.9	0.4	0.0	0.7	16.0	0.0	40.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.0	6.9	7.1	1.9	15.6	20.1	0.6	0.0	0.8	7.7	0.0	12.0
LnGrp Delay(d),s/veh	85.6	29.8	29.7	40.3	80.2	136.4	25.6	0.0	26.1	46.5	0.0	72.3
LnGrp LOS	F	C	C	D	F	F	C		C	D		E
Approach Vol, veh/h		934			1470			71			650	
Approach Delay, s/veh		46.1			95.8			25.9			60.7	
Approach LOS		D			F			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	12.0	27.0		20.0	16.0	23.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	8.0	23.0		16.0	12.0	19.0
Max Q Clear Time (g_c+I1), s		3.6	5.1	14.2		17.5	13.9	21.0
Green Ext Time (p_c), s		0.2	0.0	2.7		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	72.1
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	252	584	23	69	857	426	21	7	37	417	19	103
Future Volume (veh/h)	252	584	23	69	857	426	21	7	37	417	19	103
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	274	635	25	75	932	463	23	8	40	293	245	112
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	277	1038	41	185	874	720	295	102	350	369	252	115
Arrive On Green	0.15	0.29	0.29	0.07	0.16	0.16	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1845	3611	142	1845	3681	1647	1386	482	1647	1845	1260	576
Grp Volume(v), veh/h	274	323	337	75	932	463	31	0	40	293	0	357
Grp Sat Flow(s),veh/h/ln	1845	1840	1912	1845	1840	1647	1868	0	1647	1845	0	1836
Q Serve(g_s), s	11.9	12.2	12.2	3.1	19.0	17.2	1.1	0.0	1.6	12.1	0.0	15.5
Cycle Q Clear(g_c), s	11.9	12.2	12.2	3.1	19.0	17.2	1.1	0.0	1.6	12.1	0.0	15.5
Prop In Lane	1.00		0.07	1.00		1.00	0.74		1.00	1.00		0.31
Lane Grp Cap(c), veh/h	277	529	550	185	874	720	397	0	350	369	0	367
V/C Ratio(X)	0.99	0.61	0.61	0.41	1.07	0.64	0.08	0.00	0.11	0.79	0.00	0.97
Avail Cap(c_a), veh/h	277	529	550	185	874	720	397	0	350	369	0	367
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	33.9	24.6	24.6	35.0	33.6	19.3	25.2	0.0	25.4	30.4	0.0	31.8
Incr Delay (d2), s/veh	51.6	5.2	5.0	6.5	49.7	4.4	0.4	0.0	0.7	16.0	0.0	40.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	10.0	6.9	7.1	1.9	15.7	11.1	0.6	0.0	0.8	7.7	0.0	12.0
LnGrp Delay(d),s/veh	85.6	29.8	29.7	41.6	83.3	23.7	25.6	0.0	26.1	46.5	0.0	72.3
LnGrp LOS	F	C	C	D	F	C	C		C	D		E
Approach Vol, veh/h		934			1470			71			650	
Approach Delay, s/veh		46.1			62.4			25.9			60.7	
Approach LOS		D			E			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	12.0	27.0		20.0	16.0	23.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	8.0	23.0		16.0	12.0	19.0
Max Q Clear Time (g_c+I1), s		3.6	5.1	14.2		17.5	13.9	21.0
Green Ext Time (p_c), s		0.2	0.0	2.7		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	56.3
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	8.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	85	12	27	93	39	7	86	32	0	0	0
Future Vol, veh/h	40	85	12	27	93	39	7	86	32	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	43	92	13	29	101	42	8	93	35	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	8.5	8.4	8.5
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	6%	29%	17%
Vol Thru, %	69%	62%	58%
Vol Right, %	26%	9%	25%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	125	137	159
LT Vol	7	40	27
Through Vol	86	85	93
RT Vol	32	12	39
Lane Flow Rate	136	149	173
Geometry Grp	1	1	1
Degree of Util (X)	0.17	0.184	0.207
Departure Headway (Hd)	4.505	4.444	4.304
Convergence, Y/N	Yes	Yes	Yes
Cap	798	809	835
Service Time	2.529	2.463	2.322
HCM Lane V/C Ratio	0.17	0.184	0.207
HCM Control Delay	8.5	8.5	8.4
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.6	0.7	0.8

Intersection	
Int Delay, s/veh	3.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	273	214	102	49	0	0	0	0	65	0	110
Future Vol, veh/h	0	273	214	102	49	0	0	0	0	65	0	110
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	297	233	111	53	0	0	0	0	71	0	120

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	-	0	0	297	0	0	572	572	53
Stage 1	-	-	-	-	-	-	275	275	-
Stage 2	-	-	-	-	-	-	297	297	-
Critical Hdwy	-	-	-	4.12	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1264	-	0	482	430	1014
Stage 1	0	-	-	-	-	0	771	683	-
Stage 2	0	-	-	-	-	0	754	668	-
Platoon blocked, %		-	-		-				
Mov Cap-1 Maneuver	-	-	-	1264	-	-	439	0	1014
Mov Cap-2 Maneuver	-	-	-	-	-	-	439	0	-
Stage 1	-	-	-	-	-	-	702	0	-
Stage 2	-	-	-	-	-	-	754	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	5.5	11.2
HCM LOS			B

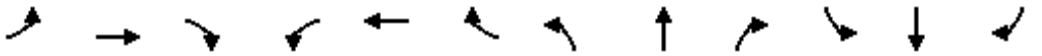
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1264	-	439	1014
HCM Lane V/C Ratio	-	-	0.088	-	0.161	0.118
HCM Control Delay (s)	-	-	8.1	0	14.8	9
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.3	-	0.6	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	537	81	1598	927	33	2440
Future Volume (veh/h)	537	81	1598	927	33	2440
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	584	0	1737	1008	36	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	480	215	1229	971	748	1174
Arrive On Green	0.14	0.00	0.36	0.52	0.42	0.00
Sat Flow, veh/h	3632	1583	3442	1863	1774	2787
Grp Volume(v), veh/h	584	0	1737	1008	36	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1863	1774	1393
Q Serve(g_s), s	19.0	0.0	50.0	73.0	1.7	0.0
Cycle Q Clear(g_c), s	19.0	0.0	50.0	73.0	1.7	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	480	215	1229	971	748	1174
V/C Ratio(X)	1.22	0.00	1.41	1.04	0.05	0.00
Avail Cap(c_a), veh/h	480	215	1229	971	748	1174
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	60.5	0.0	45.0	33.5	23.9	0.0
Incr Delay (d2), s/veh	115.0	0.0	190.8	39.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.9	0.0	56.3	47.8	0.8	0.0
LnGrp Delay(d),s/veh	175.5	0.0	235.8	72.6	24.0	0.0
LnGrp LOS	F		F	F	C	
Approach Vol, veh/h	584			2745	36	
Approach Delay, s/veh	175.5			175.9	24.0	
Approach LOS	F			F	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		63.0	54.0	23.0				77.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		59.0	50.0	19.0				73.0
Max Q Clear Time (g_c+I1), s		3.7	52.0	21.0				75.0
Green Ext Time (p_c), s		0.1	0.0	0.0				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	174.2
HCM 2010 LOS	F

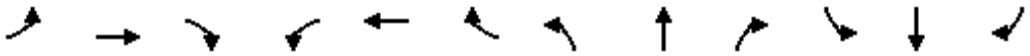
Appendix I.1 – Analysis Output Sheets (Future No Project)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	89	68	110	332	597	190	20	166	87	26	70
Future Volume (vph)	90	89	68	110	332	597	190	20	166	87	26	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3149	1441		1782	1583		1793	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3149	1441		1782	1583		1793	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	97	74	120	361	649	207	22	180	95	28	76
RTOR Reduction (vph)	0	0	65	0	216	260	0	0	120	0	0	59
Lane Group Flow (vph)	98	97	9	120	470	64	0	229	60	0	123	17
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.3	9.1	9.1	7.1	14.5	14.5		20.5	20.5		16.2	16.2
Effective Green, g (s)	5.3	9.1	9.1	7.1	14.5	14.5		20.5	20.5		16.2	16.2
Actuated g/C Ratio	0.07	0.12	0.12	0.10	0.20	0.20		0.28	0.28		0.22	0.22
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	127	230	195	170	619	283		495	440		394	347
v/s Ratio Prot	0.06	0.05		c0.07	c0.15			c0.13			c0.07	
v/s Ratio Perm			0.01			0.04			0.04			0.01
v/c Ratio	0.77	0.42	0.05	0.71	0.76	0.23		0.46	0.14		0.31	0.05
Uniform Delay, d1	33.6	29.9	28.5	32.3	28.0	24.9		22.0	20.0		24.1	22.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	24.6	0.5	0.0	12.5	4.7	0.1		3.1	0.6		2.1	0.3
Delay (s)	58.3	30.3	28.5	44.8	32.7	25.0		25.1	20.6		26.1	22.9
Level of Service	E	C	C	D	C	C		C	C		C	C
Approach Delay (s)		40.0			31.8			23.1			24.9	
Approach LOS		D			C			C			C	

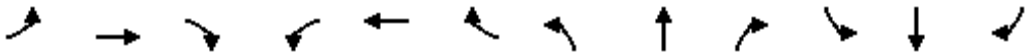
Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	73.7	Sum of lost time (s)	20.8
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	3	412	0	319	1	139	468	101	129	0
Future Volume (vph)	0	0	3	412	0	319	1	139	468	101	129	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6		4.6	4.6	4.0		4.6	4.0		4.6	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95	1.00		0.95	
Frt		0.86		1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00		0.95	0.95	1.00		1.00	1.00		0.98	
Satd. Flow (prot)		1611		1681	1681	1583		3538	1583		3463	
Flt Permitted		1.00		0.95	0.95	1.00		1.00	1.00		0.98	
Satd. Flow (perm)		1611		1681	1681	1583		3538	1583		3463	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	3	448	0	347	1	151	509	110	140	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	224	224	347	0	152	509	0	250	0
Turn Type		NA		Split	NA	Free	Split	NA	Free	Split	NA	
Protected Phases		4		8	8		2	2		6	6	
Permitted Phases	4					Free			Free			
Actuated Green, G (s)		0.9		14.0	14.0	69.9		18.4	69.9		18.2	
Effective Green, g (s)		0.9		14.0	14.0	69.9		18.4	69.9		18.2	
Actuated g/C Ratio		0.01		0.20	0.20	1.00		0.26	1.00		0.26	
Clearance Time (s)		4.6		4.6	4.6			4.6			4.6	
Vehicle Extension (s)		3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		20		336	336	1583		931	1583		901	
v/s Ratio Prot		0.00		c0.13	0.13			0.04			0.07	
v/s Ratio Perm						0.22			c0.32			
v/c Ratio		0.00		0.67	0.67	0.22		0.16	0.32		0.28	
Uniform Delay, d1		34.1		25.8	25.8	0.0		19.8	0.0		20.6	
Progression Factor		1.00		1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0		4.9	4.9	0.3		0.4	0.5		0.8	
Delay (s)		34.1		30.7	30.7	0.3		20.2	0.5		21.4	
Level of Service		C		C	C	A		C	A		C	
Approach Delay (s)		34.1			17.5			5.1			21.4	
Approach LOS		C			B			A			C	

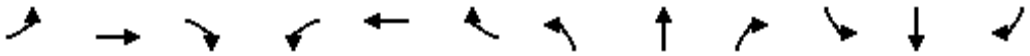
Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	69.9	Sum of lost time (s)	18.4
Intersection Capacity Utilization	40.0%	ICU Level of Service	A
Analysis Period (min)	15		
Description: SR-76 & Coast Hwy			
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	51	12	39	66	67	36	52	56	100	72	15
Future Volume (vph)	5	51	12	39	66	67	36	52	56	100	72	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	55	13	42	72	73	39	57	61	109	78	16

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	73	187	157	203
Volume Left (vph)	5	42	39	109
Volume Right (vph)	13	73	61	16
Hadj (s)	-0.06	-0.16	-0.15	0.09
Departure Headway (s)	5.0	4.7	4.7	4.8
Degree Utilization, x	0.10	0.25	0.20	0.27
Capacity (veh/h)	652	705	721	698
Control Delay (s)	8.5	9.3	8.9	9.7
Approach Delay (s)	8.5	9.3	8.9	9.7
Approach LOS	A	A	A	A

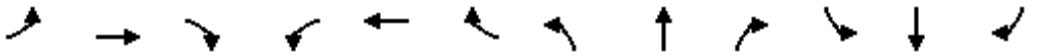
Intersection Summary				
Delay	9.2			
Level of Service	A			
Intersection Capacity Utilization	40.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	14	32	8	27	60	30	250	18	24	343	67
Future Volume (vph)	116	14	32	8	27	60	30	250	18	24	343	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.91		1.00	0.99		1.00	0.98	
Flt Protected		0.96	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1783	1583		1697		1770	3503		1770	3452	
Flt Permitted		0.68	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1259	1583		1671		1770	3503		1770	3452	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	15	35	9	29	65	33	272	20	26	373	73
RTOR Reduction (vph)	0	0	28	0	51	0	0	5	0	0	12	0
Lane Group Flow (vph)	0	141	7	0	52	0	33	287	0	26	434	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		17.1	17.1		17.1		9.0	42.1		10.0	47.9	
Effective Green, g (s)		17.1	17.1		17.1		9.0	42.1		10.0	47.9	
Actuated g/C Ratio		0.21	0.21		0.21		0.11	0.53		0.12	0.60	
Clearance Time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		3.0	7.0	
Lane Grp Cap (vph)		269	338		357		199	1843		221	2066	
v/s Ratio Prot							0.02	c0.08		0.01	c0.13	
v/s Ratio Perm		c0.11	0.00		0.03							
v/c Ratio		0.52	0.02		0.15		0.17	0.16		0.12	0.21	
Uniform Delay, d1		27.8	24.8		25.5		32.1	9.8		31.1	7.4	
Progression Factor		1.00	1.00		1.00		0.52	0.23		1.00	1.00	
Incremental Delay, d2		5.6	0.1		0.7		0.4	0.2		0.2	0.2	
Delay (s)		33.5	24.9		26.2		17.2	2.4		31.3	7.5	
Level of Service		C	C		C		B	A		C	A	
Approach Delay (s)		31.8			26.2			3.9			8.9	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.8
Intersection Capacity Utilization	43.1%	ICU Level of Service	A
Analysis Period (min)	15		

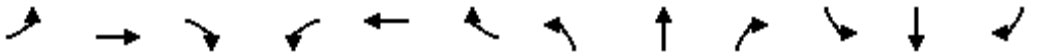
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	10	9	24	15	23	8	256	29	66	304	13
Future Volume (vph)	13	10	9	24	15	23	8	256	29	66	304	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frt	1.00	0.93		1.00	0.91			0.98			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	1730		1770	1692			3481			3491	
Flt Permitted	0.73	1.00		0.74	1.00			0.94			0.80	
Satd. Flow (perm)	1360	1730		1385	1692			3275			2802	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	11	10	26	16	25	9	278	32	72	330	14
RTOR Reduction (vph)	0	3	0	0	8	0	0	18	0	0	5	0
Lane Group Flow (vph)	14	18	0	26	33	0	0	301	0	0	411	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	53.3	53.3		53.3	53.3			17.9			17.9	
Effective Green, g (s)	53.3	53.3		53.3	53.3			17.9			17.9	
Actuated g/C Ratio	0.67	0.67		0.67	0.67			0.22			0.22	
Clearance Time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	906	1152		922	1127			732			626	
v/s Ratio Prot		0.01			c0.02							
v/s Ratio Perm	0.01			0.02				0.09			c0.15	
v/c Ratio	0.02	0.02		0.03	0.03			0.41			0.66	
Uniform Delay, d1	4.5	4.5		4.5	4.5			26.5			28.2	
Progression Factor	1.00	1.00		1.00	1.00			1.52			0.67	
Incremental Delay, d2	0.0	0.0		0.1	0.0			0.5			2.7	
Delay (s)	4.5	4.5		4.6	4.6			40.8			21.6	
Level of Service	A	A		A	A			D			C	
Approach Delay (s)		4.5			4.6			40.8			21.6	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		

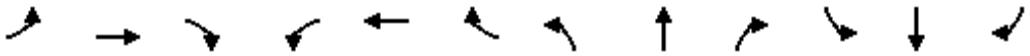
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	15	14	16	23	24	11	312	18	18	339	28
Future Volume (vph)	9	15	14	16	23	24	11	312	18	18	339	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00			1.00	
Flpb, ped/bikes	0.98	1.00		0.99	1.00			1.00			1.00	
Frt	1.00	0.93		1.00	0.92			0.99			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1732	1705		1745	1690			3497			3479	
Flt Permitted	0.72	1.00		0.74	1.00			0.93			0.92	
Satd. Flow (perm)	1320	1705		1353	1690			3268			3219	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	16	15	17	25	26	12	339	20	20	368	30
RTOR Reduction (vph)	0	5	0	0	8	0	0	9	0	0	12	0
Lane Group Flow (vph)	10	26	0	17	43	0	0	362	0	0	406	0
Confl. Peds. (#/hr)	16		11	11		16	10		17	17		10
Confl. Bikes (#/hr)			2			2						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	55.2	55.2		54.4	54.4			15.6			16.1	
Effective Green, g (s)	55.2	55.2		54.4	54.4			15.6			16.1	
Actuated g/C Ratio	0.69	0.69		0.68	0.68			0.19			0.20	
Clearance Time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Vehicle Extension (s)	3.0	3.0		3.5	3.5			3.0			3.5	
Lane Grp Cap (vph)	910	1176		920	1149			637			647	
v/s Ratio Prot		0.02			c0.03							
v/s Ratio Perm	0.01			0.01				0.11			c0.13	
v/c Ratio	0.01	0.02		0.02	0.04			0.57			0.63	
Uniform Delay, d1	3.9	3.9		4.1	4.2			29.2			29.2	
Progression Factor	1.00	1.00		1.00	1.00			0.66			0.27	
Incremental Delay, d2	0.0	0.0		0.0	0.1			1.1			2.0	
Delay (s)	3.9	3.9		4.2	4.3			20.4			10.0	
Level of Service	A	A		A	A			C			A	
Approach Delay (s)		3.9			4.2			20.4			10.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.17		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	6	22	23	11	7	101	216	8	10	148	8
Future Volume (vph)	3	6	22	23	11	7	101	216	8	10	148	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	7	24	25	12	8	110	235	9	11	161	9

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	10	24	45	228	127	92	90
Volume Left (vph)	3	0	25	110	0	11	0
Volume Right (vph)	0	24	8	0	9	0	9
Hadj (s)	0.18	-0.67	0.04	0.28	-0.02	0.09	-0.04
Departure Headway (s)	6.0	5.1	5.8	5.2	4.9	5.1	5.0
Degree Utilization, x	0.02	0.03	0.07	0.33	0.17	0.13	0.12
Capacity (veh/h)	553	639	577	684	721	676	696
Control Delay (s)	7.9	7.1	9.2	9.4	7.7	7.7	7.5
Approach Delay (s)	7.3		9.2	8.8		7.6	
Approach LOS	A		A	A		A	

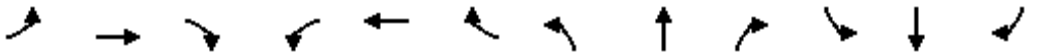
Intersection Summary				
Delay	8.4			
Level of Service	A			
Intersection Capacity Utilization	32.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	128	60	123	90	35	108
Future Volume (vph)	128	60	123	90	35	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	139	65	134	98	38	117

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	139	65	232	155
Volume Left (vph)	139	0	0	38
Volume Right (vph)	0	65	98	0
Hadj (s)	0.53	-0.67	-0.22	0.08
Departure Headway (s)	5.9	4.7	4.4	4.8
Degree Utilization, x	0.23	0.09	0.29	0.21
Capacity (veh/h)	571	710	777	708
Control Delay (s)	9.5	7.0	9.2	9.1
Approach Delay (s)	8.7		9.2	9.1
Approach LOS	A		A	A

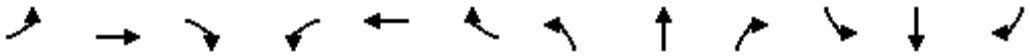
Intersection Summary			
Delay	9.0		
Level of Service	A		
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	133	39	175	32	0	0	0	0	30	40
Future Volume (vph)	18	0	133	39	175	32	0	0	0	0	30	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0						4.0	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.98						0.92	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3457						3239	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3457						3239	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	0	145	42	190	35	0	0	0	0	33	43
RTOR Reduction (vph)	0	0	133	37	25	0	0	0	0	0	15	0
Lane Group Flow (vph)	20	0	12	5	200	0	0	0	0	0	61	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	6.6		6.6	9.9	9.9						51.5	
Effective Green, g (s)	6.6		6.6	9.9	9.9						51.5	
Actuated g/C Ratio	0.08		0.08	0.12	0.12						0.64	
Clearance Time (s)	4.0		4.0	4.0	4.0						4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	146		229	219	427						2085	
v/s Ratio Prot	c0.01		0.00	0.00	c0.06						c0.02	
v/s Ratio Perm												
v/c Ratio	0.14		0.05	0.02	0.47						0.03	
Uniform Delay, d1	34.1		33.8	30.8	32.6						5.2	
Progression Factor	1.00		1.00	1.83	0.94						1.00	
Incremental Delay, d2	0.4		0.1	0.0	0.8						0.0	
Delay (s)	34.5		33.9	56.3	31.5						5.2	
Level of Service	C		C	E	C						A	
Approach Delay (s)		34.0			35.4			0.0			5.2	
Approach LOS		C			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	30.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		

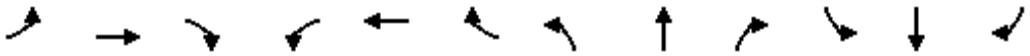
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	173	260	88	69	510	0	0	291	31
Future Volume (vph)	0	0	0	173	260	88	69	510	0	0	291	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.0	5.0		5.0	5.0			5.0	
Lane Util. Factor				1.00	0.95		1.00	0.95			0.95	
Frpb, ped/bikes				1.00	0.99		1.00	1.00			1.00	
Flpb, ped/bikes				0.99	1.00		1.00	1.00			1.00	
Frt				1.00	0.96		1.00	1.00			0.99	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1744	3383		1770	3539			3476	
Flt Permitted				0.95	1.00		0.50	1.00			1.00	
Satd. Flow (perm)				1744	3383		924	3539			3476	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	188	283	96	75	554	0	0	316	34
RTOR Reduction (vph)	0	0	0	0	28	0	0	0	0	0	14	0
Lane Group Flow (vph)	0	0	0	188	351	0	75	554	0	0	336	0
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					8			2			6	
Permitted Phases				8			2					
Actuated Green, G (s)				49.3	49.3		20.7	20.7			20.7	
Effective Green, g (s)				49.3	49.3		20.7	20.7			20.7	
Actuated g/C Ratio				0.62	0.62		0.26	0.26			0.26	
Clearance Time (s)				5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)				3.0	3.0		4.0	4.0			4.0	
Lane Grp Cap (vph)				1074	2084		239	915			899	
v/s Ratio Prot					0.10			c0.16			0.10	
v/s Ratio Perm				c0.11			0.08					
v/c Ratio				0.18	0.17		0.31	0.61			0.37	
Uniform Delay, d1				6.6	6.6		23.9	26.1			24.3	
Progression Factor				1.00	1.00		0.55	0.54			0.32	
Incremental Delay, d2				0.4	0.2		1.0	1.3			0.4	
Delay (s)				7.0	6.7		14.1	15.5			8.2	
Level of Service				A	A		B	B			A	
Approach Delay (s)		0.0			6.8			15.3			8.2	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	155	1	172	581	223	15	30	260	150	58	8
Future Volume (vph)	28	155	1	172	581	223	15	30	260	150	58	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3536		1770	3539	1583		1833	1583	1681	1716	
Flt Permitted	0.41	1.00		0.65	1.00	1.00		0.87	1.00	0.73	0.85	
Satd. Flow (perm)	767	3536		1202	3539	1583		1626	1583	1283	1491	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	168	1	187	632	242	16	33	283	163	63	9
RTOR Reduction (vph)	0	1	0	0	0	128	0	0	215	0	7	0
Lane Group Flow (vph)	30	168	0	187	632	114	0	49	68	116	112	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	15.9	15.9		15.5	15.5	15.5		7.9	7.9	7.9	7.9	
Effective Green, g (s)	15.9	15.9		15.5	15.5	15.5		7.9	7.9	7.9	7.9	
Actuated g/C Ratio	0.48	0.48		0.47	0.47	0.47		0.24	0.24	0.24	0.24	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	369	1703		564	1662	743		389	378	307	356	
v/s Ratio Prot		0.05			c0.18							
v/s Ratio Perm	0.04			0.16		0.07		0.03	0.04	c0.09	0.08	
v/c Ratio	0.08	0.10		0.33	0.38	0.15		0.13	0.18	0.38	0.32	
Uniform Delay, d1	4.6	4.7		5.5	5.6	5.0		9.8	10.0	10.5	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.0		0.4	0.2	0.1		0.2	0.3	1.1	0.7	
Delay (s)	4.7	4.7		5.9	5.8	5.1		10.0	10.3	11.6	11.0	
Level of Service	A	A		A	A	A		B	B	B	B	
Approach Delay (s)		4.7			5.7			10.2			11.3	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	33.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	43.8%	ICU Level of Service	A
Analysis Period (min)	15		

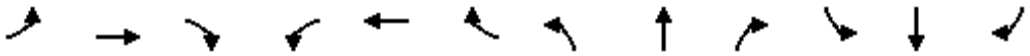
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	142	18	63	50	17	24
Future Volume (Veh/h)	142	18	63	50	17	24
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	154	20	68	54	18	26
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			174		354	164
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			174		354	164
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		97	97
cM capacity (veh/h)			1403		613	881

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	174	122	44
Volume Left	0	68	18
Volume Right	20	0	26
cSH	1700	1403	747
Volume to Capacity	0.10	0.05	0.06
Queue Length 95th (ft)	0	4	5
Control Delay (s)	0.0	4.5	10.1
Lane LOS		A	B
Approach Delay (s)	0.0	4.5	10.1
Approach LOS			B

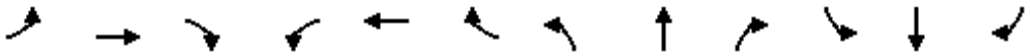
Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	28.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	56	112	0	0	0	31	267	65	74	258	59
Future Volume (vph)	100	56	112	0	0	0	31	267	65	74	258	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00					1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.97					1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00					1.00	1.00		1.00	1.00	
Frt	1.00	0.90					1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1630					1770	3419		1770	3408	
Flt Permitted	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1630					1770	3419		1770	3408	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	61	122	0	0	0	34	290	71	80	280	64
RTOR Reduction (vph)	0	84	0	0	0	0	0	34	0	0	24	0
Lane Group Flow (vph)	109	99	0	0	0	0	34	327	0	80	320	0
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA		Prot	NA	
Protected Phases	4	4					5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	24.8	24.8					9.8	14.5		27.7	32.4	
Effective Green, g (s)	24.8	24.8					9.8	14.5		27.7	32.4	
Actuated g/C Ratio	0.31	0.31					0.12	0.18		0.35	0.40	
Clearance Time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0					3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	548	505					216	619		612	1380	
v/s Ratio Prot	c0.06	0.06					0.02	c0.10		0.05	c0.09	
v/s Ratio Perm												
v/c Ratio	0.20	0.20					0.16	0.53		0.13	0.23	
Uniform Delay, d1	20.3	20.3					31.4	29.7		17.9	15.6	
Progression Factor	1.00	1.00					1.23	0.86		0.48	0.38	
Incremental Delay, d2	0.8	0.9					1.5	3.2		0.4	0.4	
Delay (s)	21.1	21.1					40.1	28.6		9.1	6.3	
Level of Service	C	C					D	C		A	A	
Approach Delay (s)		21.1			0.0			29.6			6.8	
Approach LOS		C			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	18.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	44.9%	ICU Level of Service	A
Analysis Period (min)	15		

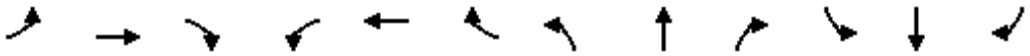
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	189	9	0	0	0	0	4	15	22	7	0
Future Volume (Veh/h)	11	189	9	0	0	0	0	4	15	22	7	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	205	10	0	0	0	0	4	16	24	8	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			215			238	234	108	144	239	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			215			238	234	108	144	239	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	98	97	99	100
cM capacity (veh/h)	1622			1352			686	660	926	788	656	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	114	112	20	32
Volume Left	12	0	0	24
Volume Right	0	10	16	0
cSH	1622	1700	857	750
Volume to Capacity	0.01	0.07	0.02	0.04
Queue Length 95th (ft)	1	0	2	3
Control Delay (s)	0.8	0.0	9.3	10.0
Lane LOS	A		A	B
Approach Delay (s)	0.4		9.3	10.0
Approach LOS			A	B

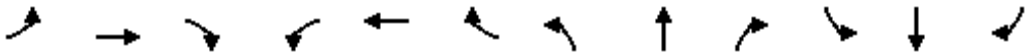
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	20.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	43	356	5	0	0	0	0	9	20	20	30	0
Future Volume (vph)	43	356	5	0	0	0	0	9	20	20	30	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	47	387	5	0	0	0	0	10	22	22	33	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	241	199	32	55
Volume Left (vph)	47	0	0	22
Volume Right (vph)	0	5	22	0
Hadj (s)	0.13	0.02	-0.38	0.11
Departure Headway (s)	4.9	4.7	4.6	5.0
Degree Utilization, x	0.32	0.26	0.04	0.08
Capacity (veh/h)	731	745	735	670
Control Delay (s)	9.0	8.2	7.7	8.4
Approach Delay (s)	8.6		7.7	8.4
Approach LOS	A		A	A

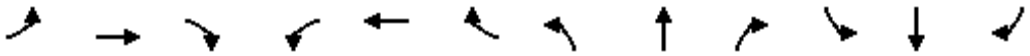
Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	27.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	53	167	11	48	0	50	0	41	36	0	0	0
Future Volume (vph)	53	167	11	48	0	50	0	41	36	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	58	182	12	52	0	54	0	45	39	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	58	194	106	84
Volume Left (vph)	58	0	52	0
Volume Right (vph)	0	12	54	39
Hadj (s)	0.53	-0.01	-0.17	-0.24
Departure Headway (s)	5.3	4.8	4.3	4.5
Degree Utilization, x	0.09	0.26	0.13	0.10
Capacity (veh/h)	664	736	805	751
Control Delay (s)	7.6	8.2	7.9	8.0
Approach Delay (s)	8.1		7.9	8.0
Approach LOS	A		A	A

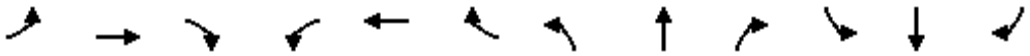
Intersection Summary				
Delay	8.0			
Level of Service	A			
Intersection Capacity Utilization	29.5%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	1	15	21	4	19	15	297	12	9	307	7
Future Volume (Veh/h)	9	1	15	21	4	19	15	297	12	9	307	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	1	16	23	4	21	16	323	13	10	334	8
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			414	
pX, platoon unblocked												
vC, conflicting volume	582	740	178	572	738	176	349			343		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	582	740	178	572	738	176	349			343		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	98	94	99	97	99			99		
cM capacity (veh/h)	370	332	829	382	333	831	1200			1206		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	27	48	178	174	177	175
Volume Left	10	23	16	0	10	0
Volume Right	16	21	0	13	0	8
cSH	548	492	1200	1700	1206	1700
Volume to Capacity	0.05	0.10	0.01	0.10	0.01	0.10
Queue Length 95th (ft)	4	8	1	0	1	0
Control Delay (s)	11.9	13.1	0.8	0.0	0.5	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	11.9	13.1	0.4		0.3	
Approach LOS	B	B				

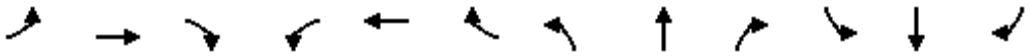
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	30.5%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	1	11	4	0	4	8	341	11	3	356	8
Future Volume (Veh/h)	6	1	11	4	0	4	8	341	11	3	356	8
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	1	12	4	0	4	9	371	12	3	387	9
Pedestrians		11			7						12	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								831			844	
pX, platoon unblocked												
vC, conflicting volume	628	816	209	614	815	210	407			390		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	628	816	209	614	815	210	407			390		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	98	99	100	99	99			100		
cM capacity (veh/h)	352	302	790	360	302	783	1138			1158		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	20	8	194	198	196	202
Volume Left	7	4	9	0	3	0
Volume Right	12	4	0	12	0	9
cSH	521	493	1138	1700	1158	1700
Volume to Capacity	0.04	0.02	0.01	0.12	0.00	0.12
Queue Length 95th (ft)	3	1	1	0	0	0
Control Delay (s)	12.2	12.4	0.4	0.0	0.1	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.2	12.4	0.2		0.1	
Approach LOS	B	B				

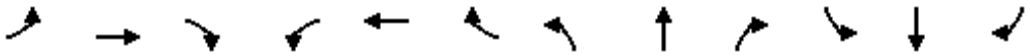
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	28.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	50	65	48	23	8	74	8	119	35	87	81	2
Future Volume (vph)	50	65	48	23	8	74	8	119	35	87	81	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	71	52	25	9	80	9	129	38	95	88	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	177	114	176	185
Volume Left (vph)	54	25	9	95
Volume Right (vph)	52	80	38	2
Hadj (s)	-0.08	-0.34	-0.09	0.13
Departure Headway (s)	4.9	4.7	4.8	5.0
Degree Utilization, x	0.24	0.15	0.23	0.26
Capacity (veh/h)	681	690	701	673
Control Delay (s)	9.4	8.5	9.3	9.7
Approach Delay (s)	9.4	8.5	9.3	9.7
Approach LOS	A	A	A	A

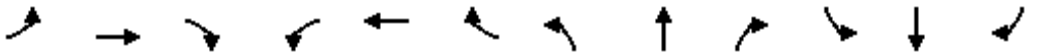
Intersection Summary				
Delay	9.3			
Level of Service	A			
Intersection Capacity Utilization	42.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	177	14	3	82	12	7	15	17	17	22	9
Future Volume (Veh/h)	6	177	14	3	82	12	7	15	17	17	22	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	192	15	3	89	13	8	16	18	18	24	10
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	116			214			345	342	206	355	344	110
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	116			214			345	342	206	355	344	110
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	97	98	97	96	99
cM capacity (veh/h)	1456			1348			569	566	829	557	565	931

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	214	105	42	52
Volume Left	7	3	8	18
Volume Right	15	13	18	10
cSH	1456	1348	656	608
Volume to Capacity	0.00	0.00	0.06	0.09
Queue Length 95th (ft)	0	0	5	7
Control Delay (s)	0.3	0.2	10.9	11.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.2	10.9	11.5
Approach LOS			B	B

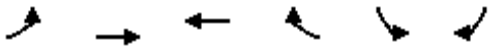
Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	24.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	36	127	56	19	17	62	319	40	11	351	17
Future Volume (vph)	50	36	127	56	19	17	62	319	40	11	351	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.88			0.98		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1645			1764		1770	3481		1770	3515	
Flt Permitted	0.89	1.00			0.71		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1649	1645			1297		1770	3481		1770	3515	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	39	138	61	21	18	67	347	43	12	382	18
RTOR Reduction (vph)	0	114	0	0	15	0	0	13	0	0	5	0
Lane Group Flow (vph)	54	63	0	0	85	0	67	377	0	12	395	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	6.7	6.7			6.7		2.1	17.8		0.6	16.3	
Effective Green, g (s)	6.7	6.7			6.7		2.1	17.8		0.6	16.3	
Actuated g/C Ratio	0.18	0.18			0.18		0.06	0.47		0.02	0.43	
Clearance Time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	289	289			228		97	1626		27	1503	
v/s Ratio Prot		0.04					c0.04	0.11		0.01	c0.11	
v/s Ratio Perm	0.03				c0.07							
v/c Ratio	0.19	0.22			0.37		0.69	0.23		0.44	0.26	
Uniform Delay, d1	13.4	13.5			13.8		17.7	6.1		18.6	7.0	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.4			1.0		19.1	0.1		11.2	0.1	
Delay (s)	13.7	13.8			14.9		36.8	6.2		29.8	7.2	
Level of Service	B	B			B		D	A		C	A	
Approach Delay (s)		13.8			14.9			10.7			7.8	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	38.1	Sum of lost time (s)	13.0
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

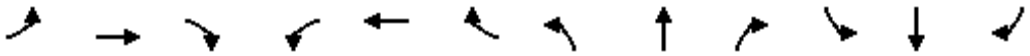
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	48	47	3	10	9
Future Volume (Veh/h)	5	48	47	3	10	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	52	51	3	11	10
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	62				124	62
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	62				124	62
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	99
cM capacity (veh/h)	1531				862	996

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	57	54	21
Volume Left	5	0	11
Volume Right	0	3	10
cSH	1531	1700	921
Volume to Capacity	0.00	0.03	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.7	0.0	9.0
Lane LOS	A		A
Approach Delay (s)	0.7	0.0	9.0
Approach LOS			A

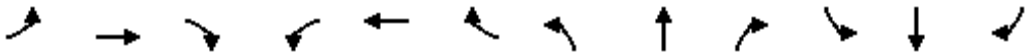
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	17.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	51	6	14	49	5	4	4	10	15	1	2
Future Volume (Veh/h)	3	51	6	14	49	5	4	4	10	15	1	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	55	7	15	53	5	4	4	11	16	1	2
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	60			62			154	154	58	165	156	60
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	60			62			154	154	58	165	156	60
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	99	99	98	100	100
cM capacity (veh/h)	1541			1541			800	728	1007	778	727	1003

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	65	73	19	19
Volume Left	3	15	4	16
Volume Right	7	5	11	2
cSH	1541	1541	887	794
Volume to Capacity	0.00	0.01	0.02	0.02
Queue Length 95th (ft)	0	1	2	2
Control Delay (s)	0.4	1.6	9.1	9.6
Lane LOS	A	A	A	A
Approach Delay (s)	0.4	1.6	9.1	9.6
Approach LOS			A	A

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	19.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	33	42	18	42	0	22	0	9	0	2	0
Future Volume (vph)	0	33	42	18	42	0	22	0	9	0	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	36	46	20	46	0	24	0	10	0	2	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	82	66	34	2
Volume Left (vph)	0	20	24	0
Volume Right (vph)	46	0	10	0
Hadj (s)	-0.30	0.09	0.00	0.03
Departure Headway (s)	3.7	4.1	4.2	4.3
Degree Utilization, x	0.09	0.08	0.04	0.00
Capacity (veh/h)	944	854	819	809
Control Delay (s)	7.1	7.5	7.4	7.3
Approach Delay (s)	7.1	7.5	7.4	7.3
Approach LOS	A	A	A	A

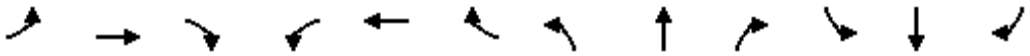
Intersection Summary				
Delay	7.3			
Level of Service	A			
Intersection Capacity Utilization	25.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	38	54	68	24	64	81
Future Volume (vph)	38	54	68	24	64	81
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	59	74	26	70	88

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	100	100	158
Volume Left (vph)	41	0	70
Volume Right (vph)	59	26	0
Hadj (s)	-0.24	-0.12	0.12
Departure Headway (s)	4.2	4.2	4.4
Degree Utilization, x	0.12	0.12	0.19
Capacity (veh/h)	792	830	805
Control Delay (s)	7.8	7.7	8.4
Approach Delay (s)	7.8	7.7	8.4
Approach LOS	A	A	A

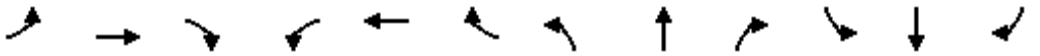
Intersection Summary			
Delay	8.0		
Level of Service	A		
Intersection Capacity Utilization	26.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	188	1	8	151	31	9	10	15	31	16	7
Future Volume (Veh/h)	6	188	1	8	151	31	9	10	15	31	16	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	204	1	9	164	34	10	11	16	34	17	8
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.94						0.94	0.94		0.94	0.94	0.94
vC, conflicting volume	201			216			449	448	224	450	432	188
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	116			216			381	380	224	382	362	103
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	98	98	93	97	99
cM capacity (veh/h)	1379			1341			508	507	803	508	518	889

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	212	207	37	59
Volume Left	7	9	10	34
Volume Right	1	34	16	8
cSH	1379	1341	603	542
Volume to Capacity	0.01	0.01	0.06	0.11
Queue Length 95th (ft)	0	1	5	9
Control Delay (s)	0.3	0.4	11.4	12.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.4	11.4	12.4
Approach LOS			B	B

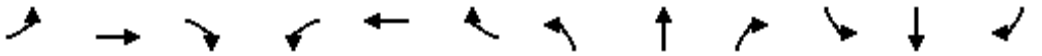
Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	27.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	119	64	123	120	128	33	259	65	140	328	14
Future Volume (vph)	19	119	64	123	120	128	33	259	65	140	328	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	0.96	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1850	1533	1681	1762	1523	1770	3420		1770	3509	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1850	1533	1681	1762	1523	1770	3420		1770	3509	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	129	70	134	130	139	36	282	71	152	357	15
RTOR Reduction (vph)	0	0	61	0	0	118	0	28	0	0	3	0
Lane Group Flow (vph)	0	150	9	121	143	21	36	325	0	152	369	0
Confl. Peds. (#/hr)	14		10	10		14			3			15
Confl. Bikes (#/hr)			4			5			3			3
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		10.8	10.8	12.2	12.2	12.2	6.1	23.4		14.8	32.1	
Effective Green, g (s)		10.8	10.8	12.2	12.2	12.2	6.1	23.4		14.8	32.1	
Actuated g/C Ratio		0.14	0.14	0.15	0.15	0.15	0.08	0.29		0.19	0.40	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.5		2.0	3.5	
Lane Grp Cap (vph)		249	206	256	268	232	134	1000		327	1407	
v/s Ratio Prot		c0.08		0.07	c0.08		0.02	c0.10		c0.09	0.11	
v/s Ratio Perm			0.01			0.01						
v/c Ratio		0.60	0.05	0.47	0.53	0.09	0.27	0.33		0.46	0.26	
Uniform Delay, d1		32.6	30.1	31.0	31.3	29.1	34.8	22.1		29.1	16.0	
Progression Factor		1.00	1.00	0.38	0.40	0.13	0.68	0.23		1.00	1.00	
Incremental Delay, d2		2.8	0.0	1.6	2.2	0.2	0.4	0.9		0.4	0.5	
Delay (s)		35.4	30.1	13.3	14.6	4.0	23.9	5.9		29.5	16.5	
Level of Service		D	C	B	B	A	C	A		C	B	
Approach Delay (s)		33.7			10.6			7.5			20.2	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

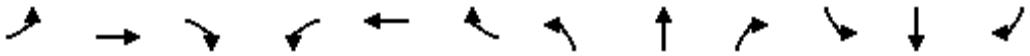
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	359	0	22	462	42	11	7	47	128	11	24
Future Volume (vph)	6	359	0	22	462	42	11	7	47	128	11	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.95
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.99			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3539		1751	3490			3087			1779	1511
Flt Permitted	0.27	1.00		0.42	1.00			0.92			0.71	1.00
Satd. Flow (perm)	494	3539		775	3490			2867			1328	1511
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	7	390	0	24	502	46	12	8	51	139	12	26
RTOR Reduction (vph)	0	0	0	0	12	0	0	18	0	0	0	9
Lane Group Flow (vph)	7	390	0	24	536	0	0	53	0	0	151	17
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	18.0	18.0		18.0	18.0			52.5			52.5	52.5
Effective Green, g (s)	18.0	18.0		18.0	18.0			52.5			52.5	52.5
Actuated g/C Ratio	0.22	0.22		0.22	0.22			0.66			0.66	0.66
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	111	796		174	785			1881			871	991
v/s Ratio Prot		0.11			c0.15							
v/s Ratio Perm	0.01			0.03				0.02			c0.11	0.01
v/c Ratio	0.06	0.49		0.14	0.68			0.03			0.17	0.02
Uniform Delay, d1	24.4	27.0		24.8	28.4			4.8			5.3	4.8
Progression Factor	0.32	0.39		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.2	0.5		0.4	2.5			0.0			0.4	0.0
Delay (s)	8.1	11.0		25.2	30.9			4.8			5.8	4.8
Level of Service	A	B		C	C			A			A	A
Approach Delay (s)		11.0			30.6			4.8			5.6	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

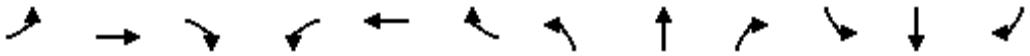
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	12	17	22	7	80	3	302	43	67	407	17
Future Volume (vph)	25	12	17	22	7	80	3	302	43	67	407	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1727			1790	1547	1770	3459		1770	3514	
Flt Permitted		0.91			0.86	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1602			1597	1547	1770	3459		1770	3514	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	13	18	24	8	87	3	328	47	73	442	18
RTOR Reduction (vph)	0	8	0	0	0	39	0	20	0	0	5	0
Lane Group Flow (vph)	0	50	0	0	32	48	3	355	0	73	455	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		44.3			44.3	44.3	0.8	11.9		10.1	21.2	
Effective Green, g (s)		44.3			44.3	44.3	0.8	11.9		10.1	21.2	
Actuated g/C Ratio		0.55			0.55	0.55	0.01	0.15		0.13	0.26	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		887			884	856	17	514		223	931	
v/s Ratio Prot							0.00	c0.10		0.04	c0.13	
v/s Ratio Perm		c0.03			0.02	0.03						
v/c Ratio		0.06			0.04	0.06	0.18	0.69		0.33	0.49	
Uniform Delay, d1		8.2			8.1	8.2	39.3	32.3		31.9	24.8	
Progression Factor		1.00			1.00	1.00	1.20	0.75		0.54	0.45	
Incremental Delay, d2		0.1			0.1	0.1	4.9	4.0		0.8	0.4	
Delay (s)		8.3			8.2	8.3	52.0	28.2		18.1	11.7	
Level of Service		A			A	A	D	C		B	B	
Approach Delay (s)		8.3			8.3			28.3			12.6	
Approach LOS		A			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		

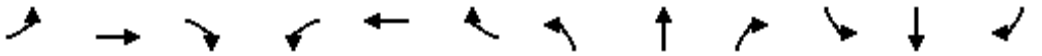
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	109	18	29	95	0	16	0	24	0	0	0
Future Volume (Veh/h)	0	109	18	29	95	0	16	0	24	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	118	20	32	103	0	17	0	26	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	103			138			295	295	128	321	305	103
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	103			138			295	295	128	321	305	103
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			97	100	97	100	100	100
cM capacity (veh/h)	1489			1446			646	603	922	604	595	952

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	138	135	43	0
Volume Left	0	32	17	0
Volume Right	20	0	26	0
cSH	1489	1446	789	1700
Volume to Capacity	0.00	0.02	0.05	0.00
Queue Length 95th (ft)	0	2	4	0
Control Delay (s)	0.0	1.9	9.8	0.0
Lane LOS		A	A	A
Approach Delay (s)	0.0	1.9	9.8	0.0
Approach LOS			A	A

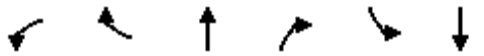
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	26.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	48	9	2	34	2	16	0	7	2	0	2
Future Volume (Veh/h)	2	48	9	2	34	2	16	0	7	2	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	52	10	2	37	2	17	0	8	2	0	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	39			62			105	104	57	111	108	38
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	39			62			105	104	57	111	108	38
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	100	99	100	100	100
cM capacity (veh/h)	1571			1541			871	784	1009	858	780	1034

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	64	41	25	4
Volume Left	2	2	17	2
Volume Right	10	2	8	2
cSH	1571	1541	911	938
Volume to Capacity	0.00	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	2	0
Control Delay (s)	0.2	0.4	9.1	8.9
Lane LOS	A	A	A	A
Approach Delay (s)	0.2	0.4	9.1	8.9
Approach LOS			A	A

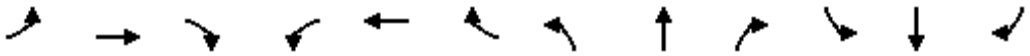
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	13.7%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	31	72	12	31	89	12
Future Volume (vph)	31	72	12	31	89	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	78	13	34	97	13

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	112	47	110
Volume Left (vph)	34	0	97
Volume Right (vph)	78	34	0
Hadj (s)	-0.32	-0.40	0.21
Departure Headway (s)	3.9	3.8	4.4
Degree Utilization, x	0.12	0.05	0.13
Capacity (veh/h)	881	894	796
Control Delay (s)	7.5	7.1	8.1
Approach Delay (s)	7.5	7.1	8.1
Approach LOS	A	A	A

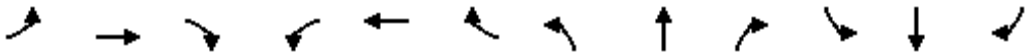
Intersection Summary			
Delay	7.6		
Level of Service	A		
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	133	74	14	88	3	56	8	14	13	9	4
Future Volume (Veh/h)	3	133	74	14	88	3	56	8	14	13	9	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	145	80	15	96	3	61	9	15	14	10	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	99			225			328	320	185	338	358	98
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	99			225			328	320	185	338	358	98
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			90	98	98	98	98	100
cM capacity (veh/h)	1494			1344			608	589	857	592	560	959

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	228	114	85	28
Volume Left	3	15	61	14
Volume Right	80	3	15	4
cSH	1494	1344	639	613
Volume to Capacity	0.00	0.01	0.13	0.05
Queue Length 95th (ft)	0	1	11	4
Control Delay (s)	0.1	1.1	11.5	11.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	1.1	11.5	11.2
Approach LOS			B	B

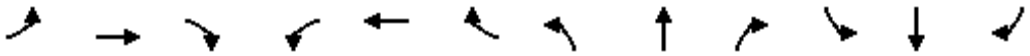
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	26.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	130	8	6	81	11	2	3	16	4	4	3
Future Volume (Veh/h)	0	130	8	6	81	11	2	3	16	4	4	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	141	9	7	88	12	2	3	17	4	4	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	100			150			258	260	146	272	258	94
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	100			150			258	260	146	272	258	94
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	99	99	100
cM capacity (veh/h)	1493			1431			686	642	902	663	643	963

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	150	107	22	11
Volume Left	0	7	2	4
Volume Right	9	12	17	3
cSH	1493	1431	832	716
Volume to Capacity	0.00	0.00	0.03	0.02
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	0.5	9.4	10.1
Lane LOS		A	A	B
Approach Delay (s)	0.0	0.5	9.4	10.1
Approach LOS			A	B

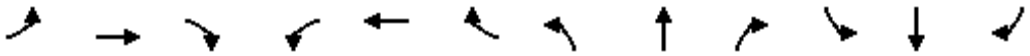
Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	19.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	80	52	39	37	19	66	271	35	44	298	13
Future Volume (vph)	28	80	52	39	37	19	66	271	35	44	298	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.96			0.97		1.00	0.98		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1765			1775		1770	3479		1770	3517	
Flt Permitted		0.94			0.68		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1676			1225		1770	3479		1770	3517	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	87	57	42	40	21	72	295	38	48	324	14
RTOR Reduction (vph)	0	25	0	0	14	0	0	8	0	0	2	0
Lane Group Flow (vph)	0	149	0	0	89	0	72	325	0	48	336	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		12.3			11.9		11.4	47.1		6.0	42.5	
Effective Green, g (s)		12.3			11.9		11.4	47.1		6.0	42.5	
Actuated g/C Ratio		0.15			0.15		0.14	0.59		0.08	0.53	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		257			182		252	2048		132	1868	
v/s Ratio Prot							c0.04	0.09		c0.03	c0.10	
v/s Ratio Perm		c0.09			0.07							
v/c Ratio		0.58			0.49		0.29	0.16		0.36	0.18	
Uniform Delay, d1		31.4			31.3		30.7	7.5		35.2	9.7	
Progression Factor		1.00			1.00		1.06	1.06		0.47	0.19	
Incremental Delay, d2		3.1			2.5		0.2	0.2		1.7	0.2	
Delay (s)		34.6			33.7		32.7	8.1		18.1	2.1	
Level of Service		C			C		C	A		B	A	
Approach Delay (s)		34.6			33.7			12.4			4.1	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

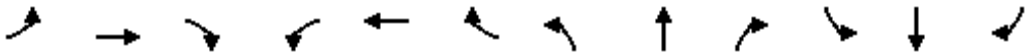
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	236	9	12	133	10	4	12	10	8	10	13
Future Volume (Veh/h)	11	236	9	12	133	10	4	12	10	8	10	13
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	257	10	13	145	11	4	13	11	9	11	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	156			267			482	468	262	480	468	150
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	156			267			482	468	262	480	468	150
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			99	97	99	98	98	98
cM capacity (veh/h)	1424			1297			472	484	777	472	484	896

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	279	169	28	34
Volume Left	12	13	4	9
Volume Right	10	11	11	14
cSH	1424	1297	565	592
Volume to Capacity	0.01	0.01	0.05	0.06
Queue Length 95th (ft)	1	1	4	5
Control Delay (s)	0.4	0.7	11.7	11.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.4	0.7	11.7	11.4
Approach LOS			B	B

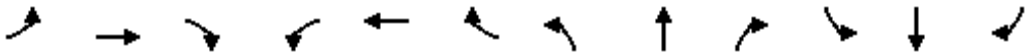
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	25.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	202	10	6	124	1	8	12	14	6	6	3
Future Volume (vph)	2	202	10	6	124	1	8	12	14	6	6	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	220	11	7	135	1	9	13	15	7	7	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	233	143	37	17
Volume Left (vph)	2	7	9	7
Volume Right (vph)	11	1	15	3
Hadj (s)	0.01	0.04	-0.16	0.01
Departure Headway (s)	4.2	4.3	4.6	4.8
Degree Utilization, x	0.27	0.17	0.05	0.02
Capacity (veh/h)	843	807	721	685
Control Delay (s)	8.7	8.2	7.8	7.9
Approach Delay (s)	8.7	8.2	7.8	7.9
Approach LOS	A	A	A	A

Intersection Summary			
Delay	8.4		
Level of Service	A		
Intersection Capacity Utilization	21.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	222	5	23	102	20	5	49	95	156	9	8
Future Volume (vph)	8	222	5	23	102	20	5	49	95	156	9	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	241	5	25	111	22	5	53	103	170	10	9

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	255	158	161	189
Volume Left (vph)	9	25	5	170
Volume Right (vph)	5	22	103	9
Hadj (s)	0.03	-0.02	-0.34	0.19
Departure Headway (s)	5.1	5.2	5.0	5.4
Degree Utilization, x	0.36	0.23	0.22	0.29
Capacity (veh/h)	656	631	648	610
Control Delay (s)	11.0	9.8	9.4	10.6
Approach Delay (s)	11.0	9.8	9.4	10.6
Approach LOS	B	A	A	B

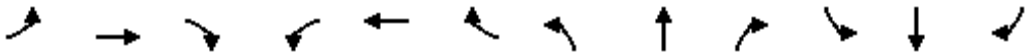
Intersection Summary				
Delay	10.3			
Level of Service	B			
Intersection Capacity Utilization	45.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	48	22	10	57	45
Future Volume (vph)	0	48	22	10	57	45
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	52	24	11	62	49

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	52	35	111
Volume Left (vph)	0	0	62
Volume Right (vph)	52	11	0
Hadj (s)	-0.57	-0.15	0.15
Departure Headway (s)	3.6	4.0	4.2
Degree Utilization, x	0.05	0.04	0.13
Capacity (veh/h)	944	882	846
Control Delay (s)	6.9	7.1	7.8
Approach Delay (s)	6.9	7.1	7.8
Approach LOS	A	A	A

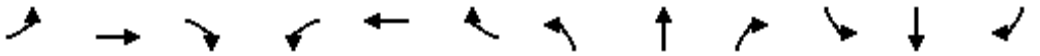
Intersection Summary			
Delay	7.4		
Level of Service	A		
Intersection Capacity Utilization	15.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	110	36	223	45	190	26	166	170	161	235	5
Future Volume (vph)	14	110	36	223	45	190	26	166	170	161	235	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97		1.00	1.00	1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.92		1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1535		1788	1583	1770	3210		1770	3526	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1535		1788	1583	1770	3210		1770	3526	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	120	39	242	49	207	28	180	185	175	255	5
RTOR Reduction (vph)	0	0	35	0	0	162	0	143	0	0	1	0
Lane Group Flow (vph)	15	120	4	0	291	45	28	222	0	175	259	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	Over	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	7.3	7.3	7.3		17.9	17.5	2.8	18.2		17.5	32.9	
Effective Green, g (s)	7.3	7.3	7.3		17.9	17.5	2.8	18.2		17.5	32.9	
Actuated g/C Ratio	0.09	0.09	0.09		0.22	0.22	0.03	0.23		0.22	0.41	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	161	169	140		400	346	61	730		387	1450	
v/s Ratio Prot	0.01	c0.06			c0.16	0.03	0.02	c0.07		c0.10	0.07	
v/s Ratio Perm			0.00									
v/c Ratio	0.09	0.71	0.03		0.73	0.13	0.46	0.30		0.45	0.18	
Uniform Delay, d1	33.3	35.3	33.1		28.8	25.1	37.9	25.6		27.1	15.0	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		0.79	0.81	
Incremental Delay, d2	0.1	11.1	0.0		6.5	0.1	2.0	1.1		0.3	0.3	
Delay (s)	33.4	46.4	33.1		35.3	25.2	39.8	26.7		21.6	12.4	
Level of Service	C	D	C		D	C	D	C		C	B	
Approach Delay (s)		42.3			31.1			27.7			16.1	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	27.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	19.1
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

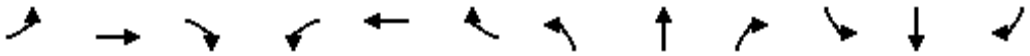
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	346	2	6	515	33	0	0	10	18	0	20
Future Volume (Veh/h)	5	346	2	6	515	33	0	0	10	18	0	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	376	2	7	560	36	0	0	11	20	0	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	596			378			1001	997	377	990	980	578
vC1, stage 1 conf vol							387	387		592	592	
vC2, stage 2 conf vol							614	610		398	388	
vCu, unblocked vol	596			332			980	976	331	969	959	578
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	98	95	100	96
cM capacity (veh/h)	980			1179			401	419	683	421	426	516

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	383	603	11	42
Volume Left	5	7	0	20
Volume Right	2	36	11	22
cSH	980	1179	683	466
Volume to Capacity	0.01	0.01	0.02	0.09
Queue Length 95th (ft)	0	0	1	7
Control Delay (s)	0.2	0.2	10.4	13.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.2	10.4	13.5
Approach LOS			B	B

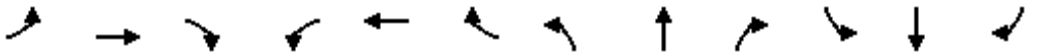
Intersection Summary				
Average Delay	0.8			
Intersection Capacity Utilization	48.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	394	2	7	620	11	2	1	16	14	1	7
Future Volume (Veh/h)	4	394	2	7	620	11	2	1	16	14	1	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	428	2	8	674	12	2	1	17	15	1	8
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked												
vC, conflicting volume	686			431			1138	1140	430	1150	1135	681
vC1, stage 1 conf vol							438	438		696	696	
vC2, stage 2 conf vol							700	702		454	439	
vCu, unblocked vol	686			431			1138	1140	430	1150	1135	681
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	100	97	96	100	98
cM capacity (veh/h)	908			1128			364	379	625	365	381	450

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	4	430	8	686	20	24
Volume Left	4	0	8	0	2	15
Volume Right	0	2	0	12	17	8
cSH	908	1700	1128	1700	566	390
Volume to Capacity	0.00	0.25	0.01	0.40	0.04	0.06
Queue Length 95th (ft)	0	0	1	0	3	5
Control Delay (s)	9.0	0.0	8.2	0.0	11.6	14.8
Lane LOS	A		A		B	B
Approach Delay (s)	0.1		0.1		11.6	14.8
Approach LOS					B	B

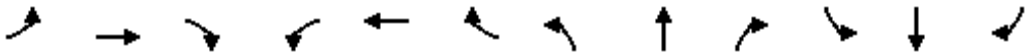
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	44.9%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	434	1	8	560	107	0	0	7	0	0	18
Future Volume (Veh/h)	22	434	1	8	560	107	0	0	7	0	0	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	472	1	9	609	116	0	0	8	0	0	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	725			473			1168	1264	472	1213	1206	667
vC1, stage 1 conf vol							520	520		685	685	
vC2, stage 2 conf vol							647	743		528	521	
vCu, unblocked vol	725			473			1168	1264	472	1213	1206	667
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			100	100	99	100	100	96
cM capacity (veh/h)	878			1089			348	339	592	351	365	459

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	24	473	9	725	8	20
Volume Left	24	0	9	0	0	0
Volume Right	0	1	0	116	8	20
cSH	878	1700	1089	1700	592	459
Volume to Capacity	0.03	0.28	0.01	0.43	0.01	0.04
Queue Length 95th (ft)	2	0	1	0	1	3
Control Delay (s)	9.2	0.0	8.3	0.0	11.2	13.2
Lane LOS	A		A		B	B
Approach Delay (s)	0.4		0.1		11.2	13.2
Approach LOS					B	B

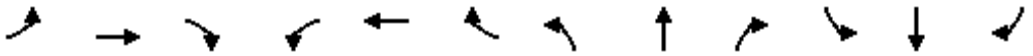
Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	52.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	51	0	0	12	22	254	5	8	573	8
Future Volume (Veh/h)	0	0	51	0	0	12	22	254	5	8	573	8
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	55	0	0	13	24	276	5	9	623	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked	0.93	0.93	0.93	0.93	0.93		0.93					
vC, conflicting volume	844	974	628	1022	976	140	632			281		
vC1, stage 1 conf vol	646	646		326	326							
vC2, stage 2 conf vol	199	329		696	650							
vCu, unblocked vol	792	933	558	984	935	140	563			281		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	87	100	100	99	97			99		
cM capacity (veh/h)	405	410	438	305	396	882	931			1278		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	55	13	24	184	97	9	632
Volume Left	0	0	24	0	0	9	0
Volume Right	55	13	0	0	5	0	9
cSH	438	882	931	1700	1700	1278	1700
Volume to Capacity	0.13	0.01	0.03	0.11	0.06	0.01	0.37
Queue Length 95th (ft)	11	1	2	0	0	1	0
Control Delay (s)	14.4	9.1	9.0	0.0	0.0	7.8	0.0
Lane LOS	B	A	A			A	
Approach Delay (s)	14.4	9.1	0.7			0.1	
Approach LOS	B	A					

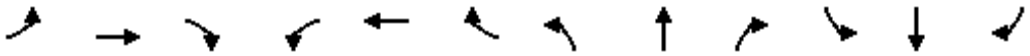
Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	40.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	8	25	33	10	5	15	329	4	4	322	18
Future Volume (vph)	52	8	25	33	10	5	15	329	4	4	322	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5		4.5			4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95			0.95	
Frt		1.00	0.85		1.00	0.85		1.00			0.99	
Flt Protected		0.96	1.00		0.96	1.00		1.00			1.00	
Satd. Flow (prot)		1786	1583		1794	1583		3526			3509	
Flt Permitted		0.72	1.00		0.73	1.00		0.94			0.95	
Satd. Flow (perm)		1345	1583		1365	1583		3309			3344	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	9	27	36	11	5	16	358	4	4	350	20
RTOR Reduction (vph)	0	0	24	0	0	5	0	0	0	0	2	0
Lane Group Flow (vph)	0	66	3	0	47	1	0	378	0	0	372	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		8.0	8.0		8.0	8.0		63.0			63.0	
Effective Green, g (s)		8.0	8.0		8.0	8.0		63.0			63.0	
Actuated g/C Ratio		0.10	0.10		0.10	0.10		0.79			0.79	
Clearance Time (s)		4.5	4.5		4.5	4.5		4.5			4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		134	158		136	158		2605			2633	
v/s Ratio Prot												
v/s Ratio Perm		c0.05	0.00		0.03	0.00		c0.11			0.11	
v/c Ratio		0.49	0.02		0.35	0.00		0.14			0.14	
Uniform Delay, d1		34.1	32.5		33.6	32.4		2.0			2.0	
Progression Factor		1.00	1.00		1.00	1.00		1.00			0.94	
Incremental Delay, d2		2.8	0.0		1.5	0.0		0.1			0.1	
Delay (s)		36.9	32.5		35.1	32.4		2.2			2.0	
Level of Service		D	C		D	C		A			A	
Approach Delay (s)		35.6			34.8			2.2			2.0	
Approach LOS		D			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		

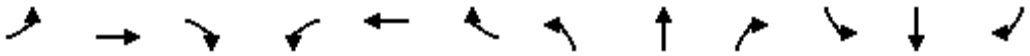
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	0	8	3	0	1	7	241	3	1	241	3
Future Volume (Veh/h)	3	0	8	3	0	1	7	241	3	1	241	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	0	9	3	0	1	8	262	3	1	262	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								836			1100	
pX, platoon unblocked												
vC, conflicting volume	414	546	132	422	546	132	265			265		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	414	546	132	422	546	132	265			265		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	99	99	100	100	99			100		
cM capacity (veh/h)	520	440	892	508	440	892	1296			1296		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	12	4	139	134	132	134
Volume Left	3	3	8	0	1	0
Volume Right	9	1	0	3	0	3
cSH	757	570	1296	1700	1296	1700
Volume to Capacity	0.02	0.01	0.01	0.08	0.00	0.08
Queue Length 95th (ft)	1	1	0	0	0	0
Control Delay (s)	9.8	11.4	0.5	0.0	0.1	0.0
Lane LOS	A	B	A		A	
Approach Delay (s)	9.8	11.4	0.3		0.0	
Approach LOS	A	B				

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	21.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	4	7	11	3	30	3	141	11	28	137	9
Future Volume (Veh/h)	3	4	7	11	3	30	3	141	11	28	137	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	4	8	12	3	33	3	153	12	30	149	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								538			726	
pX, platoon unblocked												
vC, conflicting volume	331	385	80	310	384	82	159			165		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	331	385	80	310	384	82	159			165		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	99	99	98	99	97	100			98		
cM capacity (veh/h)	565	535	965	600	535	961	1418			1411		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	15	48	80	88	104	84
Volume Left	3	12	3	0	30	0
Volume Right	8	33	0	12	0	10
cSH	712	801	1418	1700	1411	1700
Volume to Capacity	0.02	0.06	0.00	0.05	0.02	0.05
Queue Length 95th (ft)	2	5	0	0	2	0
Control Delay (s)	10.2	9.8	0.3	0.0	2.3	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	10.2	9.8	0.1		1.3	
Approach LOS	B	A				

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	22.9%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	154	7	34	7	66	8	23	735	17
Future Volume (veh/h)	0	0	0	154	7	34	7	66	8	23	735	17
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h				173	0	0	8	72	0	25	799	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				1135	0	507	142	1831	570	142	1274	570
Arrive On Green				0.32	0.00	0.00	0.08	0.36	0.00	0.08	0.36	0.00
Sat Flow, veh/h				3548	0	1583	1774	5085	1583	1774	3539	1583
Grp Volume(v), veh/h				173	0	0	8	72	0	25	799	0
Grp Sat Flow(s),veh/h/ln				1774	0	1583	1774	1695	1583	1774	1770	1583
Q Serve(g_s), s				1.7	0.0	0.0	0.2	0.5	0.0	0.7	9.3	0.0
Cycle Q Clear(g_c), s				1.7	0.0	0.0	0.2	0.5	0.0	0.7	9.3	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				1135	0	507	142	1831	570	142	1274	570
V/C Ratio(X)				0.15	0.00	0.00	0.06	0.04	0.00	0.18	0.63	0.00
Avail Cap(c_a), veh/h				1135	0	507	142	1831	570	142	1274	570
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				12.2	0.0	0.0	21.3	10.4	0.0	21.5	13.2	0.0
Incr Delay (d2), s/veh				0.3	0.0	0.0	0.8	0.0	0.0	2.7	2.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.9	0.0	0.0	0.1	0.2	0.0	0.4	5.0	0.0
LnGrp Delay(d),s/veh				12.4	0.0	0.0	22.0	10.4	0.0	24.2	15.6	0.0
LnGrp LOS				B			C	B		C	B	
Approach Vol, veh/h					173			80			824	
Approach Delay, s/veh					12.4			11.6			15.8	
Approach LOS					B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	22.0			8.0	22.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	18.0			4.0	18.0		16.0
Max Q Clear Time (g_c+I1), s	2.7	2.5			2.2	11.3		3.7
Green Ext Time (p_c), s	0.0	0.3			0.0	2.9		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	15.0
HCM 2010 LOS	B

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	450	160	402	919	0	0
Future Volume (veh/h)	450	160	402	919	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863		
Adj Flow Rate, veh/h	489	174	437	999		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1770	792	1032	3185		
Arrive On Green	0.50	0.50	0.30	0.90		
Sat Flow, veh/h	3632	1583	3442	3632		
Grp Volume(v), veh/h	489	174	437	999		
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770		
Q Serve(g_s), s	3.2	2.5	4.1	1.6		
Cycle Q Clear(g_c), s	3.2	2.5	4.1	1.6		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1770	792	1032	3185		
V/C Ratio(X)	0.28	0.22	0.42	0.31		
Avail Cap(c_a), veh/h	1770	792	1032	3185		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.8	5.6	11.2	0.3		
Incr Delay (d2), s/veh	0.4	0.6	1.3	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.7	1.2	2.1	0.8		
LnGrp Delay(d),s/veh	6.2	6.3	12.5	0.5		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	663			1436		
Approach Delay, s/veh	6.2			4.2		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			16.0	24.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			12.0	20.0				36.0
Max Q Clear Time (g_c+I1), s			6.1	5.2				3.6
Green Ext Time (p_c), s			0.9	3.4				8.7

Intersection Summary	
HCM 2010 Ctrl Delay	4.8
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	576	59	717	1772	59	1
Future Volume (veh/h)	576	59	717	1772	59	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	626	64	779	1926	64	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	944	422	918	2124	473	422
Arrive On Green	0.27	0.27	0.27	0.60	0.27	0.00
Sat Flow, veh/h	3632	1583	3442	3632	1774	1583
Grp Volume(v), veh/h	626	64	779	1926	64	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770	1774	1583
Q Serve(g_s), s	9.5	1.9	12.9	28.7	1.6	0.0
Cycle Q Clear(g_c), s	9.5	1.9	12.9	28.7	1.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	944	422	918	2124	473	422
V/C Ratio(X)	0.66	0.15	0.85	0.91	0.14	0.00
Avail Cap(c_a), veh/h	944	422	918	2124	473	422
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.6	16.8	20.9	10.5	16.7	0.0
Incr Delay (d2), s/veh	3.7	0.8	9.6	7.1	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.1	0.9	7.3	15.7	0.9	0.0
LnGrp Delay(d),s/veh	23.3	17.6	30.5	17.6	17.3	0.0
LnGrp LOS	C	B	C	B	B	
Approach Vol, veh/h	690			2705	64	
Approach Delay, s/veh	22.7			21.3	17.3	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		3.6	14.9	11.5				30.7
Green Ext Time (p_c), s		0.1	0.4	1.8				4.7

Intersection Summary	
HCM 2010 Ctrl Delay	21.5
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	297	4	95	516	168	10	0	113	21	32	33
Future Volume (veh/h)	0	297	4	95	516	168	10	0	113	21	32	33
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	1863	1863	0	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	323	4	103	561	0	11	0	123	23	35	36
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1102	14	273	1906	853	0	0	0	546	573	487
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3673	44	1774	3539	1583		0		1774	1863	1583
Grp Volume(v), veh/h	0	160	167	103	561	0		0.0		23	35	36
Grp Sat Flow(s),veh/h/ln	0	1770	1855	1774	1770	1583				1774	1863	1583
Q Serve(g_s), s	0.0	3.6	3.6	2.7	4.5	0.0				0.5	0.7	0.8
Cycle Q Clear(g_c), s	0.0	3.6	3.6	2.7	4.5	0.0				0.5	0.7	0.8
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	544	571	273	1906	853				546	573	487
V/C Ratio(X)	0.00	0.29	0.29	0.38	0.29	0.00				0.04	0.06	0.07
Avail Cap(c_a), veh/h	0	544	571	273	1906	853				546	573	487
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.7	13.7	19.8	6.6	0.0				12.6	12.7	12.8
Incr Delay (d2), s/veh	0.0	1.4	1.3	3.9	0.4	0.0				0.1	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.9	2.0	1.6	2.3	0.0				0.3	0.4	0.4
LnGrp Delay(d),s/veh	0.0	15.1	15.0	23.7	7.0	0.0				12.8	12.9	13.0
LnGrp LOS		B	B	C	A					B	B	B
Approach Vol, veh/h		327			664						94	
Approach Delay, s/veh		15.0			9.6						12.9	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			4.7	5.6		2.8		6.5
Green Ext Time (p_c), s			0.1	1.3		0.2		3.8

Intersection Summary	
HCM 2010 Ctrl Delay	11.5
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	211	440	5	9	579	314	10	10	19	122	2	52
Future Volume (veh/h)	211	440	5	9	579	314	10	10	19	122	2	52
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	229	478	5	10	629	341	11	11	21	96	54	57
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	260	1100	12	95	755	338	194	194	338	378	177	187
Arrive On Green	0.15	0.31	0.31	0.05	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1774	3588	38	1774	3539	1583	909	909	1583	1774	831	877
Grp Volume(v), veh/h	229	236	247	10	629	341	22	0	21	96	0	111
Grp Sat Flow(s),veh/h/ln	1774	1770	1856	1774	1770	1583	1817	0	1583	1774	0	1708
Q Serve(g_s), s	9.5	8.0	8.0	0.4	12.8	16.0	0.7	0.0	0.8	3.4	0.0	4.1
Cycle Q Clear(g_c), s	9.5	8.0	8.0	0.4	12.8	16.0	0.7	0.0	0.8	3.4	0.0	4.1
Prop In Lane	1.00		0.02	1.00		1.00	0.50		1.00	1.00		0.51
Lane Grp Cap(c), veh/h	260	543	569	95	755	338	388	0	338	378	0	364
V/C Ratio(X)	0.88	0.43	0.43	0.11	0.83	1.01	0.06	0.00	0.06	0.25	0.00	0.30
Avail Cap(c_a), veh/h	260	543	569	95	755	338	388	0	338	378	0	364
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.4	20.8	20.8	33.8	28.2	29.5	23.5	0.0	23.5	24.5	0.0	24.8
Incr Delay (d2), s/veh	31.9	2.5	2.4	2.2	10.4	51.4	0.3	0.0	0.4	1.6	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	4.2	4.4	0.3	7.3	11.8	0.4	0.0	0.4	1.8	0.0	2.2
LnGrp Delay(d),s/veh	63.3	23.3	23.2	36.0	38.7	80.9	23.8	0.0	23.9	26.1	0.0	27.0
LnGrp LOS	E	C	C	D	D	F	C		C	C		C
Approach Vol, veh/h		712			980			43			207	
Approach Delay, s/veh		36.1			53.4			23.8			26.6	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	27.0		20.0	15.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	23.0		16.0	11.0	16.0
Max Q Clear Time (g_c+I1), s		2.8	2.4	10.0		6.1	11.5	18.0
Green Ext Time (p_c), s		0.1	0.0	2.3		0.6	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	43.5
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	68	397	283	82	787	164	251	124	78	202	259	177
Future Volume (veh/h)	68	397	283	82	787	164	251	124	78	202	259	177
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	74	432	308	89	855	178	204	232	85	220	282	192
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	101	481	341	127	910	407	405	426	362	405	426	362
Arrive On Green	0.06	0.24	0.24	0.07	0.26	0.26	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1774	1982	1403	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	74	385	355	89	855	178	204	232	85	220	282	192
Grp Sat Flow(s),veh/h/ln	1774	1770	1615	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	2.9	14.8	14.9	3.4	16.6	6.6	7.0	7.7	3.1	7.6	9.6	7.5
Cycle Q Clear(g_c), s	2.9	14.8	14.9	3.4	16.6	6.6	7.0	7.7	3.1	7.6	9.6	7.5
Prop In Lane	1.00		0.87	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	101	430	392	127	910	407	405	426	362	405	426	362
V/C Ratio(X)	0.73	0.90	0.90	0.70	0.94	0.44	0.50	0.54	0.23	0.54	0.66	0.53
Avail Cap(c_a), veh/h	101	430	392	127	910	407	405	426	362	405	426	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	25.7	25.7	31.8	25.5	21.8	23.5	23.8	22.0	23.8	24.5	23.7
Incr Delay (d2), s/veh	36.8	24.0	26.7	27.8	18.3	3.4	4.4	4.9	1.5	5.1	7.9	5.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	10.0	9.5	2.7	10.4	3.3	3.9	4.5	1.5	4.3	5.9	3.8
LnGrp Delay(d),s/veh	69.3	49.7	52.4	59.5	43.8	25.1	27.9	28.7	23.5	28.9	32.4	29.2
LnGrp LOS	E	D	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		814			1122			521			694	
Approach Delay, s/veh		52.6			42.1			27.6			30.4	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	8.0	22.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		9.7	5.4	16.9		11.6	4.9	18.6
Green Ext Time (p_c), s		1.3	0.0	0.0		1.3	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	39.8
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	80	6	13	60	36	1	2	5	0	0	0
Future Vol, veh/h	23	80	6	13	60	36	1	2	5	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	87	7	14	65	39	1	2	5	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	7.5	7.1
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	12%	21%	12%
Vol Thru, %	25%	73%	55%
Vol Right, %	62%	6%	33%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	8	109	109
LT Vol	1	23	13
Through Vol	2	80	60
RT Vol	5	6	36
Lane Flow Rate	9	118	118
Geometry Grp	1	1	1
Degree of Util (X)	0.01	0.133	0.127
Departure Headway (Hd)	3.986	4.047	3.863
Convergence, Y/N	Yes	Yes	Yes
Cap	883	886	928
Service Time	2.079	2.069	1.89
HCM Lane V/C Ratio	0.01	0.133	0.127
HCM Control Delay	7.1	7.7	7.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.5	0.4

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	126	60	42	51	0	0	0	0	15	0	49
Future Vol, veh/h	0	126	60	42	51	0	0	0	0	15	0	49
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	137	65	46	55	0	0	0	0	16	0	53

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	137	0	0			284	284	55
Stage 1	-	-	-	-	-	-			147	147	-
Stage 2	-	-	-	-	-	-			137	137	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1447	-	0			706	625	1012
Stage 1	0	-	-	-	-	0			880	775	-
Stage 2	0	-	-	-	-	0			890	783	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1447	-	-			683	0	1012
Mov Cap-2 Maneuver	-	-	-	-	-	-			683	0	-
Stage 1	-	-	-	-	-	-			851	0	-
Stage 2	-	-	-	-	-	-			890	0	-

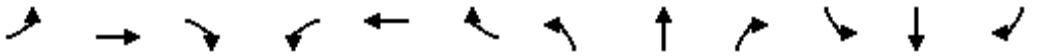
Approach	EB	WB	SB
HCM Control Delay, s	0	3.4	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1447	-	683	1012
HCM Lane V/C Ratio	-	-	0.032	-	0.024	0.053
HCM Control Delay (s)	-	-	7.6	0	10.4	8.8
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	392	145	174	930	12	166
Future Volume (veh/h)	392	145	174	930	12	166
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	426	0	189	1011	13	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1475	660	402	1118	473	743
Arrive On Green	0.42	0.00	0.12	0.60	0.27	0.00
Sat Flow, veh/h	3632	1583	3442	1863	1774	2787
Grp Volume(v), veh/h	426	0	189	1011	13	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1863	1774	1393
Q Serve(g_s), s	4.8	0.0	3.1	28.5	0.3	0.0
Cycle Q Clear(g_c), s	4.8	0.0	3.1	28.5	0.3	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1475	660	402	1118	473	743
V/C Ratio(X)	0.29	0.00	0.47	0.90	0.03	0.00
Avail Cap(c_a), veh/h	1475	660	402	1118	473	743
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	11.6	0.0	24.8	10.5	16.3	0.0
Incr Delay (d2), s/veh	0.5	0.0	3.9	11.9	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	0.0	1.7	18.0	0.2	0.0
LnGrp Delay(d),s/veh	12.1	0.0	28.7	22.4	16.4	0.0
LnGrp LOS	B		C	C	B	
Approach Vol, veh/h	426			1200	13	
Approach Delay, s/veh	12.1			23.4	16.4	
Approach LOS	B			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	11.0	29.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	7.0	25.0				36.0
Max Q Clear Time (g_c+I1), s		2.3	5.1	6.8				30.5
Green Ext Time (p_c), s		0.0	0.1	2.6				3.4

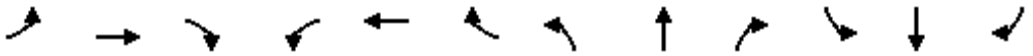
Intersection Summary	
HCM 2010 Ctrl Delay	20.4
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	118	218	560	338	1754	241	41	211	126	81	78
Future Volume (vph)	273	118	218	560	338	1754	241	41	211	126	81	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3023	1441		1787	1583		1808	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3023	1441		1787	1583		1808	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	297	128	237	609	367	1907	262	45	229	137	88	85
RTOR Reduction (vph)	0	0	203	0	423	423	0	0	131	0	0	73
Lane Group Flow (vph)	297	128	34	609	898	530	0	307	98	0	225	12
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	18.0	16.0	16.0	37.0	38.6	38.6		20.2	20.2		16.0	16.0
Effective Green, g (s)	18.0	16.0	16.0	37.0	38.6	38.6		20.2	20.2		16.0	16.0
Actuated g/C Ratio	0.16	0.15	0.15	0.34	0.35	0.35		0.18	0.18		0.15	0.15
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	289	270	230	595	1060	505		328	290		262	230
v/s Ratio Prot	0.17	0.07		c0.34	0.30			c0.17			c0.12	
v/s Ratio Perm			0.02			c0.37			0.06			0.01
v/c Ratio	1.03	0.47	0.15	1.02	1.00dr	1.05		0.94	0.34		0.86	0.05
Uniform Delay, d1	46.0	43.1	41.1	36.5	33.0	35.7		44.3	39.1		45.9	40.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	60.3	0.5	0.1	43.0	6.1	53.5		35.8	3.1		28.8	0.4
Delay (s)	106.3	43.6	41.2	79.5	39.1	89.2		80.0	42.2		74.7	40.9
Level of Service	F	D	D	E	D	F		F	D		E	D
Approach Delay (s)		70.8			64.2			63.9			65.4	
Approach LOS		E			E			E			E	

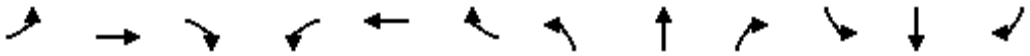
Intersection Summary			
HCM 2000 Control Delay	65.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	114.4%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	6	667	0	274	6	345	680	471	442	3
Future Volume (vph)	0	0	6	667	0	274	6	345	680	471	442	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6		4.6	4.6	4.0		4.6	4.0		4.6	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95	1.00		0.95	
Frt		0.86		1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00		0.95	0.95	1.00		1.00	1.00		0.97	
Satd. Flow (prot)		1611		1681	1681	1583		3536	1583		3449	
Flt Permitted		1.00		0.95	0.95	1.00		1.00	1.00		0.97	
Satd. Flow (perm)		1611		1681	1681	1583		3536	1583		3449	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	7	725	0	298	7	375	739	512	480	3
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	362	363	298	0	382	739	0	995	0
Turn Type		NA		Split	NA	Free	Split	NA	Free	Split	NA	
Protected Phases		4		8	8		2	2		6	6	
Permitted Phases	4					Free			Free			
Actuated Green, G (s)		1.0		23.4	23.4	93.1		18.8	93.1		31.5	
Effective Green, g (s)		1.0		23.4	23.4	93.1		18.8	93.1		31.5	
Actuated g/C Ratio		0.01		0.25	0.25	1.00		0.20	1.00		0.34	
Clearance Time (s)		4.6		4.6	4.6			4.6			4.6	
Vehicle Extension (s)		3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		17		422	422	1583		714	1583		1166	
v/s Ratio Prot		0.00		0.22	c0.22			0.11			c0.29	
v/s Ratio Perm						0.19			c0.47			
v/c Ratio		0.00		0.86	0.86	0.19		0.54	0.47		0.85	
Uniform Delay, d1		45.6		33.3	33.3	0.0		33.2	0.0		28.7	
Progression Factor		1.00		1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.1		15.7	16.2	0.3		2.9	1.0		8.0	
Delay (s)		45.7		49.0	49.5	0.3		36.1	1.0		36.7	
Level of Service		D		D	D	A		D	A		D	
Approach Delay (s)		45.7			35.0			13.0			36.7	
Approach LOS		D			C			B			D	

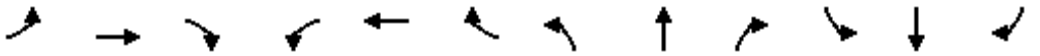
Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	93.1	Sum of lost time (s)	18.4
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
Description: SR-76 & Coast Hwy			
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	50	33	83	85	126	52	95	87	145	129	31
Future Volume (vph)	1	50	33	83	85	126	52	95	87	145	129	31
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	54	36	90	92	137	57	103	95	158	140	34

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	91	319	255	332
Volume Left (vph)	1	90	57	158
Volume Right (vph)	36	137	95	34
Hadj (s)	-0.20	-0.17	-0.14	0.07
Departure Headway (s)	6.0	5.6	5.5	5.6
Degree Utilization, x	0.15	0.49	0.39	0.52
Capacity (veh/h)	497	600	591	603
Control Delay (s)	10.1	13.8	12.1	14.5
Approach Delay (s)	10.1	13.8	12.1	14.5
Approach LOS	B	B	B	B

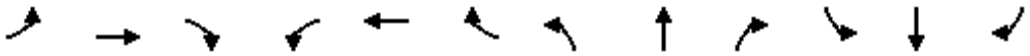
Intersection Summary				
Delay	13.3			
Level of Service	B			
Intersection Capacity Utilization	62.6%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	65	71	15	57	37	50	636	23	60	643	122
Future Volume (vph)	168	65	71	15	57	37	50	636	23	60	643	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.95		1.00	0.99		1.00	0.98	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1798	1583		1766		1770	3521		1770	3454	
Flt Permitted		0.76	1.00		0.96		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1408	1583		1705		1770	3521		1770	3454	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	183	71	77	16	62	40	54	691	25	65	699	133
RTOR Reduction (vph)	0	0	53	0	25	0	0	3	0	0	16	0
Lane Group Flow (vph)	0	254	24	0	93	0	54	713	0	65	816	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		19.3	19.3		19.3		5.5	20.9		10.3	30.5	
Effective Green, g (s)		19.3	19.3		19.3		5.5	20.9		10.3	30.5	
Actuated g/C Ratio		0.31	0.31		0.31		0.09	0.34		0.17	0.50	
Clearance Time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		3.0	7.0	
Lane Grp Cap (vph)		443	498		536		158	1200		297	1718	
v/s Ratio Prot							c0.03	c0.20		0.04	c0.24	
v/s Ratio Perm		c0.18	0.02		0.05							
v/c Ratio		0.57	0.05		0.17		0.34	0.59		0.22	0.47	
Uniform Delay, d1		17.6	14.6		15.2		26.2	16.7		22.0	10.1	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		4.2	0.1		0.6		1.3	0.8		0.4	0.7	
Delay (s)		21.8	14.8		15.8		27.5	17.5		22.4	10.9	
Level of Service		C	B		B		C	B		C	B	
Approach Delay (s)		20.2			15.8			18.2			11.7	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	61.3	Sum of lost time (s)	10.8
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		

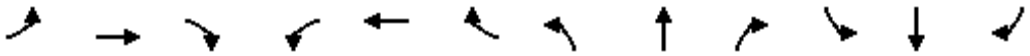
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	42	35	38	50	82	29	667	70	46	696	33
Future Volume (vph)	39	42	35	38	50	82	29	667	70	46	696	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frt	1.00	0.93		1.00	0.91			0.99			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1736		1770	1689			3484			3506	
Flt Permitted	0.67	1.00		0.70	1.00			0.90			0.83	
Satd. Flow (perm)	1240	1736		1308	1689			3136			2906	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	46	38	41	54	89	32	725	76	50	757	36
RTOR Reduction (vph)	0	20	0	0	46	0	0	15	0	0	6	0
Lane Group Flow (vph)	42	64	0	41	97	0	0	818	0	0	837	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	33.8	33.8		33.8	33.8			27.4			27.4	
Effective Green, g (s)	33.8	33.8		33.8	33.8			27.4			27.4	
Actuated g/C Ratio	0.48	0.48		0.48	0.48			0.39			0.39	
Clearance Time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	598	838		631	815			1227			1137	
v/s Ratio Prot		0.04			c0.06							
v/s Ratio Perm	0.03			0.03				0.26			c0.29	
v/c Ratio	0.07	0.08		0.06	0.12			0.67			0.74	
Uniform Delay, d1	9.7	9.7		9.7	9.9			17.5			18.2	
Progression Factor	1.00	1.00		1.00	1.00			0.49			1.00	
Incremental Delay, d2	0.2	0.2		0.2	0.3			1.3			2.7	
Delay (s)	9.9	9.9		9.9	10.2			9.9			20.9	
Level of Service	A	A		A	B			A			C	
Approach Delay (s)		9.9			10.1			9.9			20.9	
Approach LOS		A			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

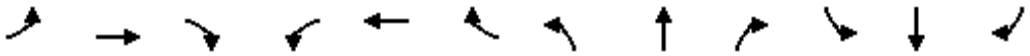
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	49	67	29	49	81	51	763	67	37	763	114
Future Volume (vph)	60	49	67	29	49	81	51	763	67	37	763	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00			0.99	
Flpb, ped/bikes	0.98	1.00		0.99	1.00			1.00			1.00	
Frt	1.00	0.91		1.00	0.91			0.99			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1741	1676		1751	1654			3480			3448	
Flt Permitted	0.67	1.00		0.68	1.00			0.77			0.87	
Satd. Flow (perm)	1222	1676		1246	1654			2704			3020	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	53	73	32	53	88	55	829	73	40	829	124
RTOR Reduction (vph)	0	41	0	0	50	0	0	11	0	0	21	0
Lane Group Flow (vph)	65	85	0	32	91	0	0	946	0	0	972	0
Confl. Peds. (#/hr)	16		11	11		16	10		17	17		10
Confl. Bikes (#/hr)			2			2						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	30.9	30.9		30.1	30.1			29.9			30.4	
Effective Green, g (s)	30.9	30.9		30.1	30.1			29.9			30.4	
Actuated g/C Ratio	0.44	0.44		0.43	0.43			0.43			0.43	
Clearance Time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Vehicle Extension (s)	3.0	3.0		3.5	3.5			3.0			3.5	
Lane Grp Cap (vph)	539	739		535	711			1154			1311	
v/s Ratio Prot		0.05			c0.05							
v/s Ratio Perm	0.05			0.03				c0.35			0.32	
v/c Ratio	0.12	0.12		0.06	0.13			0.82			0.74	
Uniform Delay, d1	11.5	11.5		11.7	12.0			17.7			16.5	
Progression Factor	1.00	1.00		1.00	1.00			0.73			0.35	
Incremental Delay, d2	0.5	0.3		0.2	0.4			4.4			2.2	
Delay (s)	12.0	11.8		11.9	12.4			17.3			8.0	
Level of Service	B	B		B	B			B			A	
Approach Delay (s)		11.9			12.3			17.3			8.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	87.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	16	16	133	146	16	27	46	394	68	27	354	13
Future Volume (vph)	16	16	133	146	16	27	46	394	68	27	354	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	17	145	159	17	29	50	428	74	29	385	14

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	34	145	205	264	288	222	207
Volume Left (vph)	17	0	159	50	0	29	0
Volume Right (vph)	0	145	29	0	74	0	14
Hadj (s)	0.28	-0.67	0.10	0.13	-0.15	0.10	-0.01
Departure Headway (s)	7.9	6.9	7.4	6.8	6.5	6.9	6.8
Degree Utilization, x	0.07	0.28	0.42	0.50	0.52	0.42	0.39
Capacity (veh/h)	418	465	460	508	539	501	509
Control Delay (s)	10.3	11.4	15.6	15.0	15.0	13.7	12.8
Approach Delay (s)	11.2		15.6	15.0		13.3	
Approach LOS	B		C	C		B	

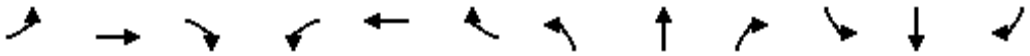
Intersection Summary				
Delay	14.1			
Level of Service	B			
Intersection Capacity Utilization	52.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	290	106	176	202	77	206
Future Volume (vph)	290	106	176	202	77	206
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	315	115	191	220	84	224

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	315	115	411	308
Volume Left (vph)	315	0	0	84
Volume Right (vph)	0	115	220	0
Hadj (s)	0.53	-0.67	-0.29	0.09
Departure Headway (s)	7.0	5.8	5.5	6.0
Degree Utilization, x	0.61	0.19	0.63	0.51
Capacity (veh/h)	483	590	626	571
Control Delay (s)	19.4	8.9	17.3	15.2
Approach Delay (s)	16.6		17.3	15.2
Approach LOS	C		C	C

Intersection Summary			
Delay	16.5		
Level of Service	C		
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	350	92	322	88	0	0	0	0	130	94
Future Volume (vph)	45	0	350	92	322	88	0	0	0	0	130	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0						4.0	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.94	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3425						3316	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3425						3316	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	0	380	100	350	96	0	0	0	0	141	102
RTOR Reduction (vph)	0	0	339	79	41	0	0	0	0	0	50	0
Lane Group Flow (vph)	49	0	41	21	405	0	0	0	0	0	193	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	7.6		7.6	14.4	14.4						36.0	
Effective Green, g (s)	7.6		7.6	14.4	14.4						36.0	
Actuated g/C Ratio	0.11		0.11	0.21	0.21						0.51	
Clearance Time (s)	4.0		4.0	4.0	4.0						4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	192		302	364	704						1705	
v/s Ratio Prot	c0.03		0.01	0.01	c0.12						c0.06	
v/s Ratio Perm												
v/c Ratio	0.26		0.14	0.06	0.57						0.11	
Uniform Delay, d1	28.6		28.2	22.3	25.0						8.8	
Progression Factor	1.00		1.00	0.36	0.62						1.00	
Incremental Delay, d2	0.7		0.2	0.0	0.8						0.1	
Delay (s)	29.3		28.4	8.2	16.5						8.9	
Level of Service	C		C	A	B						A	
Approach Delay (s)		28.5			14.9			0.0			8.9	
Approach LOS		C			B			A			A	

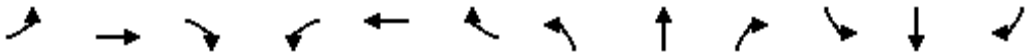
Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	33.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	241	509	88	274	748	0	0	606	195
Future Volume (vph)	0	0	0	241	509	88	274	748	0	0	606	195
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.0	5.0		5.0	5.0			5.0	
Lane Util. Factor				1.00	0.95		1.00	0.95			0.95	
Frpb, ped/bikes				1.00	1.00		1.00	1.00			0.99	
Flpb, ped/bikes				0.99	1.00		1.00	1.00			1.00	
Frt				1.00	0.98		1.00	1.00			0.96	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1747	3449		1770	3539			3384	
Flt Permitted				0.95	1.00		0.29	1.00			1.00	
Satd. Flow (perm)				1747	3449		533	3539			3384	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	262	553	96	298	813	0	0	659	212
RTOR Reduction (vph)	0	0	0	0	20	0	0	0	0	0	23	0
Lane Group Flow (vph)	0	0	0	262	629	0	298	813	0	0	848	0
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					8			2			6	
Permitted Phases				8			2					
Actuated Green, G (s)				19.2	19.2		40.8	40.8			40.8	
Effective Green, g (s)				19.2	19.2		40.8	40.8			40.8	
Actuated g/C Ratio				0.27	0.27		0.58	0.58			0.58	
Clearance Time (s)				5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)				3.0	3.0		4.0	4.0			4.0	
Lane Grp Cap (vph)				479	946		310	2062			1972	
v/s Ratio Prot					c0.18			0.23			0.25	
v/s Ratio Perm				0.15			c0.56					
v/c Ratio				0.55	0.67		0.96	0.39			0.43	
Uniform Delay, d1				21.7	22.5		13.9	7.9			8.1	
Progression Factor				1.00	1.00		0.62	0.39			0.24	
Incremental Delay, d2				4.4	3.7		32.0	0.1			0.2	
Delay (s)				26.1	26.2		40.5	3.2			2.2	
Level of Service				C	C		D	A			A	
Approach Delay (s)		0.0			26.2			13.2			2.2	
Approach LOS		A			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	203	0	186	999	326	22	103	446	455	68	27
Future Volume (vph)	23	203	0	186	999	326	22	103	446	455	68	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539		1770	3539	1583		1846	1583	1681	1688	
Flt Permitted	0.19	1.00		0.61	1.00	1.00		0.91	1.00	0.67	0.72	
Satd. Flow (perm)	355	3539		1143	3539	1583		1704	1583	1186	1254	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	221	0	202	1086	354	24	112	485	495	74	29
RTOR Reduction (vph)	0	0	0	0	0	200	0	0	308	0	8	0
Lane Group Flow (vph)	25	221	0	202	1086	154	0	136	177	292	298	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	21.0	21.0		20.6	20.6	20.6		17.3	17.3	17.3	17.3	
Effective Green, g (s)	21.0	21.0		20.6	20.6	20.6		17.3	17.3	17.3	17.3	
Actuated g/C Ratio	0.44	0.44		0.43	0.43	0.43		0.36	0.36	0.36	0.36	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	156	1564		495	1534	686		620	576	431	456	
v/s Ratio Prot		0.06			c0.31							
v/s Ratio Perm	0.07			0.18		0.10		0.08	0.11	c0.25	0.24	
v/c Ratio	0.16	0.14		0.41	0.71	0.22		0.22	0.31	0.68	0.65	
Uniform Delay, d1	8.0	7.9		9.3	11.0	8.4		10.4	10.8	12.7	12.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.1		0.7	1.6	0.2		0.2	0.4	4.6	3.7	
Delay (s)	8.6	7.9		9.9	12.6	8.6		10.7	11.2	17.3	16.3	
Level of Service	A	A		A	B	A		B	B	B	B	
Approach Delay (s)		8.0			11.4			11.1			16.8	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	47.5	Sum of lost time (s)	9.6
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
Analysis Period (min)	15		

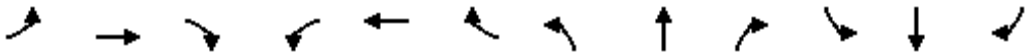
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	512	49	72	105	77	90
Future Volume (Veh/h)	512	49	72	105	77	90
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	557	53	78	114	84	98
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			610		854	584
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			610		854	584
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		72	81
cM capacity (veh/h)			969		303	512

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	610	192	182
Volume Left	0	78	84
Volume Right	53	0	98
cSH	1700	969	388
Volume to Capacity	0.36	0.08	0.47
Queue Length 95th (ft)	0	7	61
Control Delay (s)	0.0	4.1	22.2
Lane LOS		A	C
Approach Delay (s)	0.0	4.1	22.2
Approach LOS			C

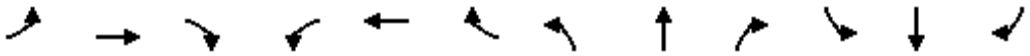
Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	59.2%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	396	222	263	0	0	0	109	609	162	168	523	129
Future Volume (vph)	396	222	263	0	0	0	109	609	162	168	523	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00					1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98					1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00					1.00	1.00		1.00	1.00	
Frt	1.00	0.92					1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1676					1770	3413		1770	3402	
Flt Permitted	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1676					1770	3413		1770	3402	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	430	241	286	0	0	0	118	662	176	183	568	140
RTOR Reduction (vph)	0	61	0	0	0	0	0	34	0	0	33	0
Lane Group Flow (vph)	430	466	0	0	0	0	118	804	0	183	675	0
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA		Prot	NA	
Protected Phases	4	4					5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	24.8	24.8					10.3	21.4		10.8	21.9	
Effective Green, g (s)	24.8	24.8					10.3	21.4		10.8	21.9	
Actuated g/C Ratio	0.35	0.35					0.15	0.31		0.15	0.31	
Clearance Time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0					3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	627	593					260	1043		273	1064	
v/s Ratio Prot	0.24	c0.28					0.07	c0.24		0.10	c0.20	
v/s Ratio Perm												
v/c Ratio	0.69	0.79					0.45	0.77		0.67	0.63	
Uniform Delay, d1	19.3	20.2					27.3	22.1		27.9	20.6	
Progression Factor	1.00	1.00					0.80	0.74		0.88	0.72	
Incremental Delay, d2	6.0	10.1					5.3	5.2		11.3	2.6	
Delay (s)	25.3	30.3					27.0	21.5		36.0	17.5	
Level of Service	C	C					C	C		D	B	
Approach Delay (s)		28.0			0.0			22.2			21.3	
Approach LOS		C			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

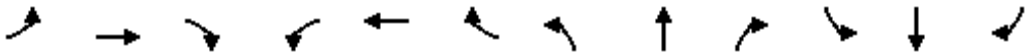
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	532	32	0	0	0	0	10	32	32	27	0
Future Volume (Veh/h)	17	532	32	0	0	0	0	10	32	32	27	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	578	35	0	0	0	0	11	35	35	29	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			613			646	632	306	366	649	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			613			646	632	306	366	649	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	95	93	92	100
cM capacity (veh/h)	1622			962			333	392	689	521	383	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	307	324	46	64
Volume Left	18	0	0	35
Volume Right	0	35	35	0
cSH	1622	1700	583	448
Volume to Capacity	0.01	0.19	0.08	0.14
Queue Length 95th (ft)	1	0	6	12
Control Delay (s)	0.5	0.0	11.7	14.4
Lane LOS	A		B	B
Approach Delay (s)	0.3		11.7	14.4
Approach LOS			B	B

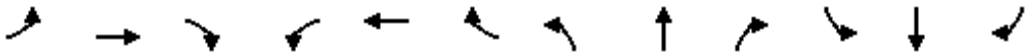
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	32.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	69	962	30	0	0	0	0	32	31	81	116	0
Future Volume (vph)	69	962	30	0	0	0	0	32	31	81	116	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	1046	33	0	0	0	0	35	34	88	126	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	598	556	69	214
Volume Left (vph)	75	0	0	88
Volume Right (vph)	0	33	34	0
Hadj (s)	0.10	-0.01	-0.26	0.12
Departure Headway (s)	5.5	5.4	6.0	6.0
Degree Utilization, x	0.91	0.83	0.11	0.36
Capacity (veh/h)	598	556	590	588
Control Delay (s)	38.5	27.8	9.7	12.4
Approach Delay (s)	33.3		9.7	12.4
Approach LOS	D		A	B

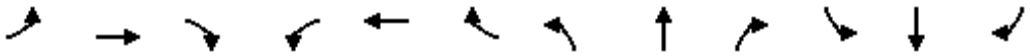
Intersection Summary				
Delay	29.1			
Level of Service	D			
Intersection Capacity Utilization	53.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	158	470	17	52	0	11	0	17	14	0	0	0
Future Volume (vph)	158	470	17	52	0	11	0	17	14	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	172	511	18	57	0	12	0	18	15	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	172	529	69	33
Volume Left (vph)	172	0	57	0
Volume Right (vph)	0	18	12	15
Hadj (s)	0.53	0.01	0.09	-0.24
Departure Headway (s)	5.2	4.7	4.8	5.2
Degree Utilization, x	0.25	0.68	0.09	0.05
Capacity (veh/h)	689	768	725	631
Control Delay (s)	8.7	15.9	8.3	8.5
Approach Delay (s)	14.1		8.3	8.5
Approach LOS	B		A	A

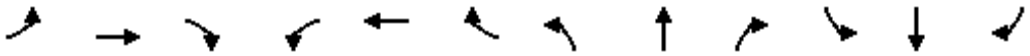
Intersection Summary				
Delay	13.4			
Level of Service	B			
Intersection Capacity Utilization	42.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	3	43	19	7	19	19	727	27	14	665	20
Future Volume (Veh/h)	13	3	43	19	7	19	19	727	27	14	665	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	3	47	21	8	21	21	790	29	15	723	22
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			414	
pX, platoon unblocked	0.93	0.93	0.93	0.93	0.93		0.93					
vC, conflicting volume	1234	1639	380	1294	1636	418	752			826		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1098	1534	178	1162	1530	418	579			826		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	90	97	94	83	92	96	98			98		
cM capacity (veh/h)	134	101	770	122	102	580	915			796		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	64	50	416	424	376	384
Volume Left	14	21	21	0	15	0
Volume Right	47	21	0	29	0	22
cSH	328	174	915	1700	796	1700
Volume to Capacity	0.19	0.29	0.02	0.25	0.02	0.23
Queue Length 95th (ft)	18	28	2	0	1	0
Control Delay (s)	18.6	33.7	0.7	0.0	0.6	0.0
Lane LOS	C	D	A		A	
Approach Delay (s)	18.6	33.7	0.4		0.3	
Approach LOS	C	D				

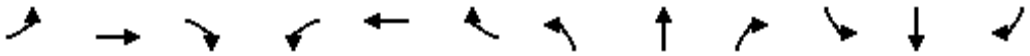
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	46.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	0	32	14	0	12	21	816	19	24	741	27
Future Volume (Veh/h)	6	0	32	14	0	12	21	816	19	24	741	27
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	35	15	0	13	23	887	21	26	805	29
Pedestrians		11			7						12	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								831			844	
pX, platoon unblocked	0.91	0.91		0.91	0.91	0.91				0.91		
vC, conflicting volume	1397	1844	428	1440	1848	473	845			915		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1242	1732	428	1289	1736	229	845			714		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	94	85	100	98	97			97		
cM capacity (veh/h)	108	73	570	97	73	694	780			800		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	42	28	466	464	428	432
Volume Left	7	15	23	0	26	0
Volume Right	35	13	0	21	0	29
cSH	333	161	780	1700	800	1700
Volume to Capacity	0.13	0.17	0.03	0.27	0.03	0.25
Queue Length 95th (ft)	11	15	2	0	3	0
Control Delay (s)	17.4	31.9	0.9	0.0	1.0	0.0
Lane LOS	C	D	A		A	
Approach Delay (s)	17.4	31.9	0.4		0.5	
Approach LOS	C	D				

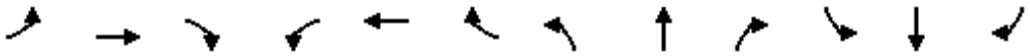
Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	52.9%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	114	169	82	79	14	126	12	225	63	150	138	6
Future Volume (vph)	114	169	82	79	14	126	12	225	63	150	138	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	124	184	89	86	15	137	13	245	68	163	150	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	397	238	326	320
Volume Left (vph)	124	86	13	163
Volume Right (vph)	89	137	68	7
Hadj (s)	-0.04	-0.24	-0.08	0.12
Departure Headway (s)	6.9	7.2	7.1	7.3
Degree Utilization, x	0.76	0.48	0.64	0.65
Capacity (veh/h)	493	426	464	454
Control Delay (s)	28.7	16.6	21.7	22.5
Approach Delay (s)	28.7	16.6	21.7	22.5
Approach LOS	D	C	C	C

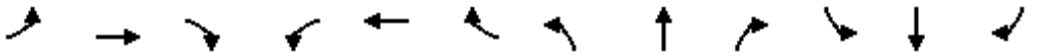
Intersection Summary				
Delay	23.1			
Level of Service	C			
Intersection Capacity Utilization	67.4%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	292	27	12	203	30	26	42	42	24	56	11
Future Volume (Veh/h)	10	292	27	12	203	30	26	42	42	24	56	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	317	29	13	221	33	28	46	46	26	61	12
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	268			353			668	654	338	700	652	252
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	268			353			668	654	338	700	652	252
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			91	88	93	91	84	98
cM capacity (veh/h)	1281			1199			310	372	700	288	373	776

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	357	267	120	99
Volume Left	11	13	28	26
Volume Right	29	33	46	12
cSH	1281	1199	429	367
Volume to Capacity	0.01	0.01	0.28	0.27
Queue Length 95th (ft)	1	1	28	27
Control Delay (s)	0.3	0.5	16.6	18.4
Lane LOS	A	A	C	C
Approach Delay (s)	0.3	0.5	16.6	18.4
Approach LOS			C	C

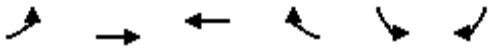
Intersection Summary				
Average Delay	4.8			
Intersection Capacity Utilization	35.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	84	170	77	68	13	149	722	83	15	722	47
Future Volume (vph)	95	84	170	77	68	13	149	722	83	15	722	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.90			0.99		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1675			1798		1770	3485		1770	3507	
Flt Permitted	0.62	1.00			0.45		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1161	1675			827		1770	3485		1770	3507	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	91	185	84	74	14	162	785	90	16	785	51
RTOR Reduction (vph)	0	118	0	0	6	0	0	9	0	0	5	0
Lane Group Flow (vph)	103	158	0	0	166	0	162	866	0	16	831	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	14.6	14.6			14.6		10.8	41.6		0.8	31.6	
Effective Green, g (s)	14.6	14.6			14.6		10.8	41.6		0.8	31.6	
Actuated g/C Ratio	0.21	0.21			0.21		0.15	0.59		0.01	0.45	
Clearance Time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	242	349			172		273	2071		20	1583	
v/s Ratio Prot		0.09					c0.09	0.25		0.01	c0.24	
v/s Ratio Perm	0.09				c0.20							
v/c Ratio	0.43	0.45			0.97		0.59	0.42		0.80	0.52	
Uniform Delay, d1	24.1	24.2			27.5		27.6	7.7		34.5	13.8	
Progression Factor	1.00	1.00			1.00		1.00	1.00		0.78	0.64	
Incremental Delay, d2	1.2	0.9			58.5		3.4	0.6		108.1	1.2	
Delay (s)	25.3	25.1			85.9		31.0	8.3		135.0	10.0	
Level of Service	C	C			F		C	A		F	B	
Approach Delay (s)		25.2			85.9			11.8			12.4	
Approach LOS		C			F			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

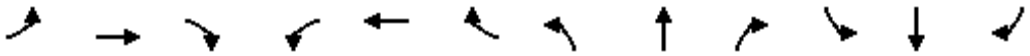
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	101	75	14	21	21
Future Volume (Veh/h)	5	101	75	14	21	21
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	110	82	15	23	23
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	105				218	98
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	105				218	98
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	98
cM capacity (veh/h)	1476				761	950

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	115	97	46
Volume Left	5	0	23
Volume Right	0	15	23
cSH	1476	1700	845
Volume to Capacity	0.00	0.06	0.05
Queue Length 95th (ft)	0	0	4
Control Delay (s)	0.3	0.0	9.5
Lane LOS	A		A
Approach Delay (s)	0.3	0.0	9.5
Approach LOS			A

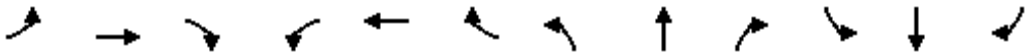
Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	19.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	118	2	1	79	13	1	1	2	19	0	14
Future Volume (Veh/h)	10	118	2	1	79	13	1	1	2	19	0	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	128	2	1	86	14	1	1	2	21	0	15
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	102			130			263	255	129	250	249	97
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	102			130			263	255	129	250	249	97
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	97	100	98
cM capacity (veh/h)	1488			1455			673	642	921	694	647	956

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	141	101	4	36
Volume Left	11	1	1	21
Volume Right	2	14	2	15
cSH	1488	1455	767	784
Volume to Capacity	0.01	0.00	0.01	0.05
Queue Length 95th (ft)	1	0	0	4
Control Delay (s)	0.6	0.1	9.7	9.8
Lane LOS	A	A	A	A
Approach Delay (s)	0.6	0.1	9.7	9.8
Approach LOS			A	A

Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	24.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	79	63	21	57	1	38	1	29	0	1	0
Future Volume (vph)	1	79	63	21	57	1	38	1	29	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	86	68	23	62	1	41	1	32	0	1	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	155	86	74	1
Volume Left (vph)	1	23	41	0
Volume Right (vph)	68	1	32	0
Hadj (s)	-0.23	0.08	-0.11	0.03
Departure Headway (s)	3.9	4.3	4.3	4.5
Degree Utilization, x	0.17	0.10	0.09	0.00
Capacity (veh/h)	892	815	789	737
Control Delay (s)	7.7	7.8	7.7	7.5
Approach Delay (s)	7.7	7.8	7.7	7.5
Approach LOS	A	A	A	A

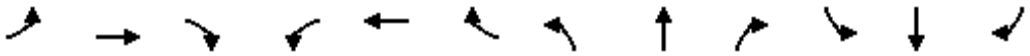
Intersection Summary				
Delay	7.7			
Level of Service	A			
Intersection Capacity Utilization	35.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	51	106	147	75	77	143
Future Volume (vph)	51	106	147	75	77	143
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	115	160	82	84	155

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	170	242	239
Volume Left (vph)	55	0	84
Volume Right (vph)	115	82	0
Hadj (s)	-0.31	-0.17	0.10
Departure Headway (s)	4.7	4.4	4.7
Degree Utilization, x	0.22	0.30	0.31
Capacity (veh/h)	702	774	729
Control Delay (s)	9.0	9.3	9.8
Approach Delay (s)	9.0	9.3	9.8
Approach LOS	A	A	A

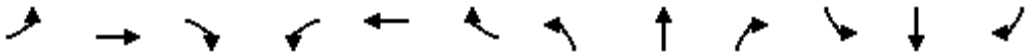
Intersection Summary			
Delay	9.4		
Level of Service	A		
Intersection Capacity Utilization	43.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	375	22	20	310	69	30	42	40	75	26	21
Future Volume (Veh/h)	14	375	22	20	310	69	30	42	40	75	26	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	408	24	22	337	75	33	46	43	82	28	23
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.88						0.88	0.88		0.88	0.88	0.88
vC, conflicting volume	415			443			920	920	439	946	894	382
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	264			443			840	839	439	868	810	225
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			84	82	93	55	89	97
cM capacity (veh/h)	1138			1107			212	253	608	183	263	710

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	447	434	122	133
Volume Left	15	22	33	82
Volume Right	24	75	43	23
cSH	1138	1107	299	227
Volume to Capacity	0.01	0.02	0.41	0.59
Queue Length 95th (ft)	1	2	48	83
Control Delay (s)	0.4	0.6	25.1	41.1
Lane LOS	A	A	D	E
Approach Delay (s)	0.4	0.6	25.1	41.1
Approach LOS			D	E

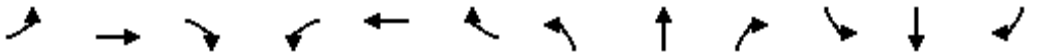
Intersection Summary				
Average Delay	7.9			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	51	196	74	286	190	276	78	740	184	285	628	27
Future Volume (vph)	51	196	74	286	190	276	78	740	184	285	628	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	0.96	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844	1534	1681	1751	1521	1770	3421		1770	3508	
Flt Permitted		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1844	1534	1681	1751	1521	1770	3421		1770	3508	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	55	213	80	311	207	300	85	804	200	310	683	29
RTOR Reduction (vph)	0	0	66	0	0	245	0	24	0	0	3	0
Lane Group Flow (vph)	0	268	14	255	263	55	85	980	0	310	709	0
Confl. Peds. (#/hr)	14		10	10		14			3			15
Confl. Bikes (#/hr)			4			5			3			3
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		15.6	15.6	16.1	16.1	16.1	5.3	24.4		12.8	31.9	
Effective Green, g (s)		15.6	15.6	16.1	16.1	16.1	5.3	24.4		12.8	31.9	
Actuated g/C Ratio		0.18	0.18	0.18	0.18	0.18	0.06	0.28		0.15	0.36	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.5		2.0	3.5	
Lane Grp Cap (vph)		328	272	308	321	279	106	951		258	1276	
v/s Ratio Prot		c0.15		c0.15	0.15		0.05	c0.29		c0.18	0.20	
v/s Ratio Perm			0.01			0.04						
v/c Ratio		0.82	0.05	0.83	0.82	0.20	0.80	1.03		1.20	0.56	
Uniform Delay, d1		34.7	29.9	34.5	34.4	30.3	40.7	31.7		37.5	22.2	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		13.8	0.0	16.9	15.3	0.4	32.3	37.3		121.7	0.6	
Delay (s)		48.5	29.9	51.4	49.7	30.7	73.0	69.0		159.1	22.8	
Level of Service		D	C	D	D	C	E	E		F	C	
Approach Delay (s)		44.2			43.3			69.3			64.2	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	58.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	87.7	Sum of lost time (s)	18.8
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		

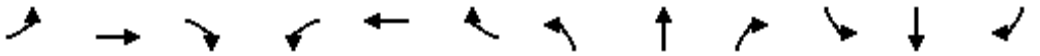
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	672	8	30	746	94	12	14	78	176	11	45
Future Volume (vph)	22	672	8	30	746	94	12	14	78	176	11	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3531		1764	3474			3088			1778	1539
Flt Permitted	0.26	1.00		0.35	1.00			0.91			0.65	1.00
Satd. Flow (perm)	490	3531		652	3474			2826			1219	1539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	730	9	33	811	102	13	15	85	191	12	49
RTOR Reduction (vph)	0	2	0	0	17	0	0	61	0	0	0	35
Lane Group Flow (vph)	24	737	0	33	896	0	0	52	0	0	203	14
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	16.4	16.4		16.4	16.4			10.0			10.0	10.0
Effective Green, g (s)	16.4	16.4		16.4	16.4			10.0			10.0	10.0
Actuated g/C Ratio	0.46	0.46		0.46	0.46			0.28			0.28	0.28
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	223	1613		297	1587			787			339	428
v/s Ratio Prot		0.21			c0.26							
v/s Ratio Perm	0.05			0.05				0.02			c0.17	0.01
v/c Ratio	0.11	0.46		0.11	0.56			0.07			0.60	0.03
Uniform Delay, d1	5.6	6.7		5.6	7.1			9.5			11.2	9.4
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.2	0.2		0.2	0.5			0.0			3.3	0.0
Delay (s)	5.8	6.9		5.7	7.6			9.6			14.5	9.5
Level of Service	A	A		A	A			A			B	A
Approach Delay (s)		6.9			7.5			9.6			13.5	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	35.9	Sum of lost time (s)	9.5
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

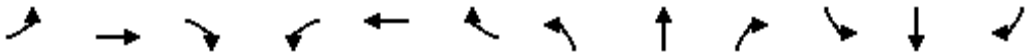
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	15	16	40	15	134	21	675	73	171	703	20
Future Volume (vph)	44	15	16	40	15	134	21	675	73	171	703	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.98	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1743			1793	1550	1770	3478		1770	3521	
Flt Permitted		0.83			0.80	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1487			1478	1550	1770	3478		1770	3521	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	16	17	43	16	146	23	734	79	186	764	22
RTOR Reduction (vph)	0	12	0	0	0	104	0	14	0	0	3	0
Lane Group Flow (vph)	0	69	0	0	59	42	23	799	0	186	783	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		19.9			19.9	19.9	1.5	19.4		17.0	34.9	
Effective Green, g (s)		19.9			19.9	19.9	1.5	19.4		17.0	34.9	
Actuated g/C Ratio		0.28			0.28	0.28	0.02	0.28		0.24	0.50	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		422			420	440	37	963		429	1755	
v/s Ratio Prot							0.01	c0.23		0.11	c0.22	
v/s Ratio Perm		c0.05			0.04	0.03						
v/c Ratio		0.16			0.14	0.09	0.62	0.83		0.43	0.45	
Uniform Delay, d1		18.8			18.7	18.4	34.0	23.7		22.4	11.3	
Progression Factor		1.00			1.00	1.00	1.32	0.41		1.00	1.00	
Incremental Delay, d2		0.8			0.7	0.4	24.3	5.1		0.7	0.2	
Delay (s)		19.6			19.4	18.8	69.0	14.8		23.1	11.5	
Level of Service		B			B	B	E	B		C	B	
Approach Delay (s)		19.6			19.0			16.2			13.7	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

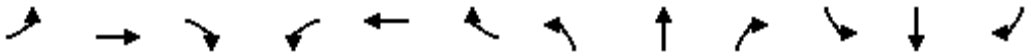
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	246	26	29	149	0	58	0	51	0	0	0
Future Volume (Veh/h)	4	246	26	29	149	0	58	0	51	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	267	28	32	162	0	63	0	55	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	162			295			515	515	281	570	529	162
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	162			295			515	515	281	570	529	162
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			86	100	93	100	100	100
cM capacity (veh/h)	1417			1266			460	451	758	392	442	883

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	299	194	118	0
Volume Left	4	32	63	0
Volume Right	28	0	55	0
cSH	1417	1266	563	1700
Volume to Capacity	0.00	0.03	0.21	0.00
Queue Length 95th (ft)	0	2	20	0
Control Delay (s)	0.1	1.5	13.1	0.0
Lane LOS	A	A	B	A
Approach Delay (s)	0.1	1.5	13.1	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	38.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	128	37	0	49	0	37	2	11	0	0	0
Future Volume (Veh/h)	0	128	37	0	49	0	37	2	11	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	139	40	0	53	0	40	2	12	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	53			179			212	212	159	225	232	53
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	53			179			212	212	159	225	232	53
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			95	100	99	100	100	100
cM capacity (veh/h)	1553			1397			745	685	886	719	668	1014

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	179	53	54	0
Volume Left	0	0	40	0
Volume Right	40	0	12	0
cSH	1553	1397	770	1700
Volume to Capacity	0.00	0.00	0.07	0.00
Queue Length 95th (ft)	0	0	6	0
Control Delay (s)	0.0	0.0	10.0	0.0
Lane LOS			B	A
Approach Delay (s)	0.0	0.0	10.0	0.0
Approach LOS			B	A

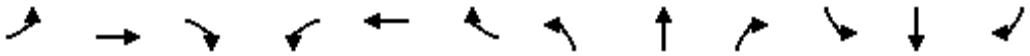
Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	19.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	72	204	22	41	244	22
Future Volume (vph)	72	204	22	41	244	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	78	222	24	45	265	24

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	300	69	289
Volume Left (vph)	78	0	265
Volume Right (vph)	222	45	0
Hadj (s)	-0.36	-0.36	0.22
Departure Headway (s)	4.4	4.6	4.9
Degree Utilization, x	0.37	0.09	0.40
Capacity (veh/h)	762	712	694
Control Delay (s)	10.0	8.1	11.1
Approach Delay (s)	10.0	8.1	11.1
Approach LOS	B	A	B

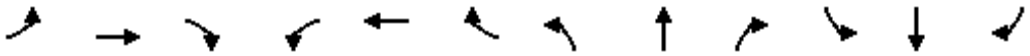
Intersection Summary			
Delay	10.3		
Level of Service	B		
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	267	100	15	209	14	136	17	21	4	12	21
Future Volume (Veh/h)	8	267	100	15	209	14	136	17	21	4	12	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	290	109	16	227	15	148	18	23	4	13	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	242			399			658	636	344	661	684	234
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	242			399			658	636	344	661	684	234
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			58	95	97	99	96	97
cM capacity (veh/h)	1324			1160			351	387	698	345	364	805

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	408	258	189	40
Volume Left	9	16	148	4
Volume Right	109	15	23	23
cSH	1324	1160	377	527
Volume to Capacity	0.01	0.01	0.50	0.08
Queue Length 95th (ft)	1	1	68	6
Control Delay (s)	0.2	0.6	23.8	12.4
Lane LOS	A	A	C	B
Approach Delay (s)	0.2	0.6	23.8	12.4
Approach LOS			C	B

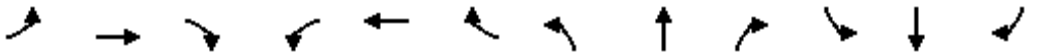
Intersection Summary				
Average Delay	5.9			
Intersection Capacity Utilization	45.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	233	6	17	194	29	3	8	16	13	3	3
Future Volume (Veh/h)	3	233	6	17	194	29	3	8	16	13	3	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	253	7	18	211	32	3	9	17	14	3	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	243			260			530	542	256	547	529	227
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	243			260			530	542	256	547	529	227
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	98	98	97	99	100
cM capacity (veh/h)	1323			1304			450	441	782	426	448	812

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	263	261	29	20
Volume Left	3	18	3	14
Volume Right	7	32	17	3
cSH	1323	1304	594	462
Volume to Capacity	0.00	0.01	0.05	0.04
Queue Length 95th (ft)	0	1	4	3
Control Delay (s)	0.1	0.7	11.4	13.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.7	11.4	13.1
Approach LOS			B	B

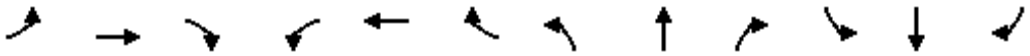
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	33.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	137	123	56	79	25	135	702	82	102	557	47
Future Volume (vph)	61	137	123	56	79	25	135	702	82	102	557	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.95			0.98		1.00	0.98		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750			1792		1770	3484		1770	3498	
Flt Permitted		0.91			0.66		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1611			1203		1770	3484		1770	3498	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	66	149	134	61	86	27	147	763	89	111	605	51
RTOR Reduction (vph)	0	32	0	0	10	0	0	12	0	0	8	0
Lane Group Flow (vph)	0	317	0	0	164	0	147	840	0	111	648	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		17.5			17.1		12.9	29.3		8.6	25.8	
Effective Green, g (s)		17.5			17.1		12.9	29.3		8.6	25.8	
Actuated g/C Ratio		0.25			0.24		0.18	0.42		0.12	0.37	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		402			293		326	1458		217	1289	
v/s Ratio Prot							c0.08	c0.24		0.06	0.19	
v/s Ratio Perm		c0.20			0.14							
v/c Ratio		0.79			0.56		0.45	0.58		0.51	0.50	
Uniform Delay, d1		24.5			23.2		25.4	15.6		28.7	17.1	
Progression Factor		1.00			1.00		1.00	1.00		0.96	0.51	
Incremental Delay, d2		9.8			2.7		0.4	1.7		1.9	1.3	
Delay (s)		34.4			25.8		25.8	17.3		29.4	10.1	
Level of Service		C			C		C	B		C	B	
Approach Delay (s)		34.4			25.8			18.5			12.9	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

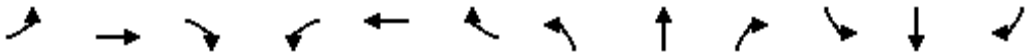
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	451	25	25	203	10	28	35	12	15	14	17
Future Volume (Veh/h)	17	451	25	25	203	10	28	35	12	15	14	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	490	27	27	221	11	30	38	13	16	15	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	232			517			846	826	504	852	834	226
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	232			517			846	826	504	852	834	226
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			88	87	98	93	95	98
cM capacity (veh/h)	1336			1049			258	296	568	239	292	813

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	535	259	81	49
Volume Left	18	27	30	16
Volume Right	27	11	13	18
cSH	1336	1049	302	349
Volume to Capacity	0.01	0.03	0.27	0.14
Queue Length 95th (ft)	1	2	26	12
Control Delay (s)	0.4	1.1	21.2	17.0
Lane LOS	A	A	C	C
Approach Delay (s)	0.4	1.1	21.2	17.0
Approach LOS			C	C

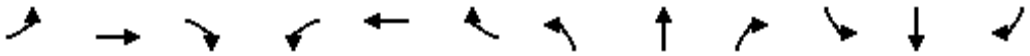
Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	41.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	333	18	22	158	3	24	35	22	5	15	7
Future Volume (vph)	10	333	18	22	158	3	24	35	22	5	15	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	362	20	24	172	3	26	38	24	5	16	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	393	199	88	29
Volume Left (vph)	11	24	26	5
Volume Right (vph)	20	3	24	8
Hadj (s)	0.01	0.05	-0.07	-0.10
Departure Headway (s)	4.5	4.7	5.2	5.3
Degree Utilization, x	0.49	0.26	0.13	0.04
Capacity (veh/h)	786	729	616	590
Control Delay (s)	11.6	9.4	9.0	8.6
Approach Delay (s)	11.6	9.4	9.0	8.6
Approach LOS	B	A	A	A

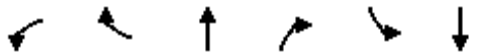
Intersection Summary				
Delay	10.5			
Level of Service	B			
Intersection Capacity Utilization	34.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	28	343	19	73	148	55	19	120	165	106	25	7
Future Volume (vph)	28	343	19	73	148	55	19	120	165	106	25	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	373	21	79	161	60	21	130	179	115	27	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	424	300	330	150
Volume Left (vph)	30	79	21	115
Volume Right (vph)	21	60	179	8
Hadj (s)	0.02	-0.03	-0.28	0.16
Departure Headway (s)	6.2	6.5	6.3	7.3
Degree Utilization, x	0.73	0.54	0.58	0.30
Capacity (veh/h)	424	509	520	409
Control Delay (s)	24.5	16.7	17.7	13.4
Approach Delay (s)	24.5	16.7	17.7	13.4
Approach LOS	C	C	C	B

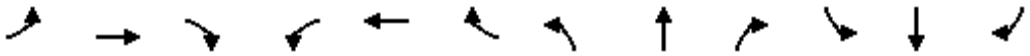
Intersection Summary				
Delay		19.3		
Level of Service		C		
Intersection Capacity Utilization		70.6%	ICU Level of Service	C
Analysis Period (min)		15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	110	92	7	73	35
Future Volume (vph)	0	110	92	7	73	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	120	100	8	79	38

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	120	108	117
Volume Left (vph)	0	0	79
Volume Right (vph)	120	8	0
Hadj (s)	-0.57	-0.01	0.17
Departure Headway (s)	3.8	4.3	4.4
Degree Utilization, x	0.13	0.13	0.14
Capacity (veh/h)	886	811	777
Control Delay (s)	7.4	7.9	8.2
Approach Delay (s)	7.4	7.9	8.2
Approach LOS	A	A	A

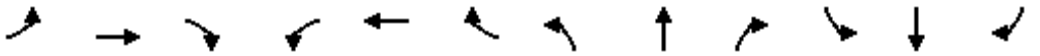
Intersection Summary			
Delay	7.8		
Level of Service	A		
Intersection Capacity Utilization	18.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	140	45	208	112	359	51	580	276	300	487	25
Future Volume (vph)	21	140	45	208	112	359	51	580	276	300	487	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1538		1804	1583	1770	3328		1770	3506	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1538		1804	1583	1770	3328		1770	3506	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	23	152	49	226	122	390	55	630	300	326	529	27
RTOR Reduction (vph)	0	0	44	0	0	316	0	55	0	0	4	0
Lane Group Flow (vph)	23	152	5	0	348	74	55	875	0	326	552	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	Over	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	10.5	10.5	10.5		20.1	17.8	5.7	26.9		17.8	39.0	
Effective Green, g (s)	10.5	10.5	10.5		20.1	17.8	5.7	26.9		17.8	39.0	
Actuated g/C Ratio	0.11	0.11	0.11		0.21	0.19	0.06	0.28		0.19	0.41	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	196	207	171		384	298	106	948		333	1448	
v/s Ratio Prot	0.01	c0.08			c0.19	0.05	0.03	c0.26		c0.18	0.16	
v/s Ratio Perm			0.00									
v/c Ratio	0.12	0.73	0.03		0.91	0.25	0.52	0.92		0.98	0.38	
Uniform Delay, d1	37.8	40.6	37.4		36.2	32.6	43.0	32.7		38.1	19.3	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	11.0	0.0		24.2	0.2	1.8	14.1		43.0	0.2	
Delay (s)	37.9	51.6	37.4		60.4	32.8	44.8	46.8		81.1	19.5	
Level of Service	D	D	D		E	C	D	D		F	B	
Approach Delay (s)		47.1			45.8			46.7			42.2	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	45.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	94.4	Sum of lost time (s)	19.1
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		

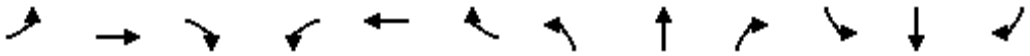
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	712	12	16	684	51	8	0	16	24	6	54
Future Volume (Veh/h)	9	712	12	16	684	51	8	0	16	24	6	54
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	774	13	17	743	55	9	0	17	26	7	59
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.92			0.92	0.92	0.92	0.92	0.92	
vC, conflicting volume	798			787			1668	1632	780	1622	1612	770
vC1, stage 1 conf vol							800	800		804	804	
vC2, stage 2 conf vol							867	832		818	807	
vCu, unblocked vol	798			728			1681	1643	721	1632	1621	770
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			96	100	96	90	97	85
cM capacity (veh/h)	824			809			221	273	395	249	274	400

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	797	815	26	92
Volume Left	10	17	9	26
Volume Right	13	55	17	59
cSH	824	809	310	332
Volume to Capacity	0.01	0.02	0.08	0.28
Queue Length 95th (ft)	1	2	7	28
Control Delay (s)	0.3	0.6	17.7	20.0
Lane LOS	A	A	C	C
Approach Delay (s)	0.3	0.6	17.7	20.0
Approach LOS			C	C

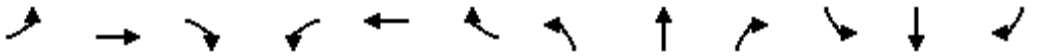
Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	61.5%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	913	6	15	898	37	1	1	23	15	1	9
Future Volume (Veh/h)	6	913	6	15	898	37	1	1	23	15	1	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	992	7	16	976	40	1	1	25	16	1	10
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	1016			1000			2030	2058	996	2060	2042	997
vC1, stage 1 conf vol							1010	1010		1028	1028	
vC2, stage 2 conf vol							1020	1048		1032	1014	
vCu, unblocked vol	1016			970			2062	2092	966	2093	2074	997
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			99	100	91	91	100	97
cM capacity (veh/h)	683			670			187	209	291	174	208	296

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	7	999	16	1016	27	27
Volume Left	7	0	16	0	1	16
Volume Right	0	7	0	40	25	10
cSH	683	1700	670	1700	281	207
Volume to Capacity	0.01	0.59	0.02	0.60	0.10	0.13
Queue Length 95th (ft)	1	0	2	0	8	11
Control Delay (s)	10.3	0.0	10.5	0.0	19.2	25.0
Lane LOS	B		B		C	D
Approach Delay (s)	0.1		0.2		19.2	25.0
Approach LOS					C	D

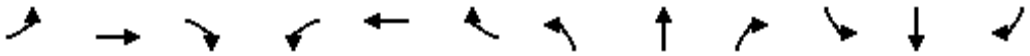
Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	64.3%	ICU Level of Service		C
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	813	0	12	836	332	0	0	7	0	0	23
Future Volume (Veh/h)	13	813	0	12	836	332	0	0	7	0	0	23
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	884	0	13	909	361	0	0	8	0	0	25
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1270			884			1872	2208	884	2036	2028	1090
vC1, stage 1 conf vol							912	912		1116	1116	
vC2, stage 2 conf vol							960	1296		920	912	
vCu, unblocked vol	1270			884			1872	2208	884	2036	2028	1090
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			98			100	100	98	100	100	90
cM capacity (veh/h)	547			765			201	180	344	188	214	262

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	14	884	13	1270	8	25
Volume Left	14	0	13	0	0	0
Volume Right	0	0	0	361	8	25
cSH	547	1700	765	1700	344	262
Volume to Capacity	0.03	0.52	0.02	0.75	0.02	0.10
Queue Length 95th (ft)	2	0	1	0	2	8
Control Delay (s)	11.8	0.0	9.8	0.0	15.7	20.2
Lane LOS	B		A		C	C
Approach Delay (s)	0.2		0.1		15.7	20.2
Approach LOS					C	C

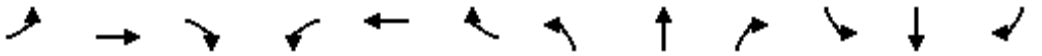
Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	80.9%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	63	0	0	21	66	824	5	20	660	6
Future Volume (Veh/h)	0	0	63	0	0	21	66	824	5	20	660	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	68	0	0	23	72	896	5	22	717	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked	0.84	0.84	0.84	0.84	0.84		0.84					
vC, conflicting volume	1380	1810	720	1872	1810	450	724			901		
vC1, stage 1 conf vol	764	764		1042	1042							
vC2, stage 2 conf vol	615	1045		829	768							
vCu, unblocked vol	1357	1867	575	1941	1869	450	579			901		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	83	100	100	96	91			97		
cM capacity (veh/h)	262	213	389	143	209	556	835			750		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	68	23	72	597	304	22	724
Volume Left	0	0	72	0	0	22	0
Volume Right	68	23	0	0	5	0	7
cSH	389	556	835	1700	1700	750	1700
Volume to Capacity	0.17	0.04	0.09	0.35	0.18	0.03	0.43
Queue Length 95th (ft)	16	3	7	0	0	2	0
Control Delay (s)	16.2	11.8	9.7	0.0	0.0	9.9	0.0
Lane LOS	C	B	A			A	
Approach Delay (s)	16.2	11.8	0.7			0.3	
Approach LOS	C	B					

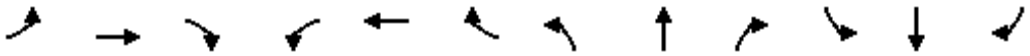
Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	45.7%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	56	55	36	8	17	18	754	31	13	754	33
Future Volume (vph)	121	56	55	36	8	17	18	754	31	13	754	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5		4.5			4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95			0.95	
Frt		1.00	0.85		1.00	0.85		0.99			0.99	
Flt Protected		0.97	1.00		0.96	1.00		1.00			1.00	
Satd. Flow (prot)		1801	1583		1790	1583		3515			3514	
Flt Permitted		0.77	1.00		0.71	1.00		0.93			0.94	
Satd. Flow (perm)		1426	1583		1316	1583		3268			3303	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	132	61	60	39	9	18	20	820	34	14	820	36
RTOR Reduction (vph)	0	0	47	0	0	14	0	3	0	0	3	0
Lane Group Flow (vph)	0	193	13	0	48	4	0	871	0	0	867	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		14.7	14.7		14.7	14.7		46.3			46.3	
Effective Green, g (s)		14.7	14.7		14.7	14.7		46.3			46.3	
Actuated g/C Ratio		0.21	0.21		0.21	0.21		0.66			0.66	
Clearance Time (s)		4.5	4.5		4.5	4.5		4.5			4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		299	332		276	332		2161			2184	
v/s Ratio Prot												
v/s Ratio Perm		c0.14	0.01		0.04	0.00		c0.27			0.26	
v/c Ratio		0.65	0.04		0.17	0.01		0.40			0.40	
Uniform Delay, d1		25.3	22.0		22.7	21.9		5.5			5.4	
Progression Factor		1.00	1.00		1.00	1.00		0.54			0.33	
Incremental Delay, d2		4.7	0.0		0.3	0.0		0.5			0.4	
Delay (s)		30.0	22.1		23.0	21.9		3.5			2.2	
Level of Service		C	C		C	C		A			A	
Approach Delay (s)		28.1			22.7			3.5			2.2	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

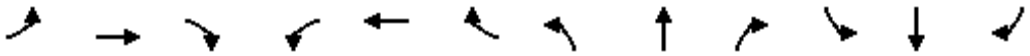
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	0	15	7	0	3	15	501	7	3	501	6
Future Volume (Veh/h)	6	0	15	7	0	3	15	501	7	3	501	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	0	16	8	0	3	16	545	8	3	545	7
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								933			1003	
pX, platoon unblocked												
vC, conflicting volume	862	1140	276	876	1139	276	552			553		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	862	1140	276	876	1139	276	552			553		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	98	97	100	100	98			100		
cM capacity (veh/h)	244	196	721	234	196	721	1014			1013		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	23	11	288	280	276	280
Volume Left	7	8	16	0	3	0
Volume Right	16	3	0	8	0	7
cSH	452	287	1014	1700	1013	1700
Volume to Capacity	0.05	0.04	0.02	0.17	0.00	0.16
Queue Length 95th (ft)	4	3	1	0	0	0
Control Delay (s)	13.4	18.0	0.6	0.0	0.1	0.0
Lane LOS	B	C	A		A	
Approach Delay (s)	13.4	18.0	0.3		0.1	
Approach LOS	B	C				

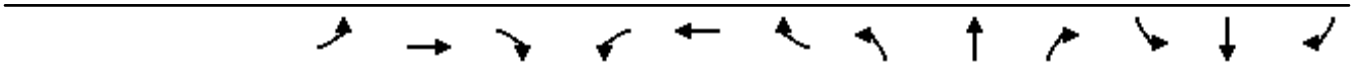
Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	34.9%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	8	15	22	11	56	14	284	23	55	270	34
Future Volume (Veh/h)	6	8	15	22	11	56	14	284	23	55	270	34
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	9	16	24	12	61	15	309	25	60	293	37
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								558			706	
pX, platoon unblocked												
vC, conflicting volume	683	796	165	638	802	167	330			334		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	683	796	165	638	802	167	330			334		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	97	98	93	96	93	99			95		
cM capacity (veh/h)	288	299	850	330	297	848	1226			1222		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	32	97	170	180	206	184
Volume Left	7	24	15	0	60	0
Volume Right	16	61	0	25	0	37
cSH	437	524	1226	1700	1222	1700
Volume to Capacity	0.07	0.19	0.01	0.11	0.05	0.11
Queue Length 95th (ft)	6	17	1	0	4	0
Control Delay (s)	13.9	13.4	0.8	0.0	2.7	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.9	13.4	0.4		1.4	
Approach LOS	B	B				

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	36.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	106	0	14	13	1056	14	25	2207	16
Future Volume (veh/h)	0	0	0	106	0	14	13	1056	14	25	2207	16
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h				115	0	0	14	1148	0	27	2399	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				631	0	281	79	3221	1003	99	2281	1020
Arrive On Green				0.18	0.00	0.00	0.04	0.63	0.00	0.06	0.64	0.00
Sat Flow, veh/h				3548	0	1583	1774	5085	1583	1774	3539	1583
Grp Volume(v), veh/h				115	0	0	14	1148	0	27	2399	0
Grp Sat Flow(s),veh/h/ln				1774	0	1583	1774	1695	1583	1774	1770	1583
Q Serve(g_s), s				2.5	0.0	0.0	0.7	9.6	0.0	1.3	58.0	0.0
Cycle Q Clear(g_c), s				2.5	0.0	0.0	0.7	9.6	0.0	1.3	58.0	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				631	0	281	79	3221	1003	99	2281	1020
V/C Ratio(X)				0.18	0.00	0.00	0.18	0.36	0.00	0.27	1.05	0.00
Avail Cap(c_a), veh/h				631	0	281	79	3221	1003	99	2281	1020
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				31.4	0.0	0.0	41.4	7.8	0.0	40.8	16.0	0.0
Incr Delay (d2), s/veh				0.6	0.0	0.0	4.9	0.3	0.0	6.8	34.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.3	0.0	0.0	0.4	4.6	0.0	0.8	38.7	0.0
LnGrp Delay(d),s/veh				32.1	0.0	0.0	46.3	8.1	0.0	47.5	50.2	0.0
LnGrp LOS				C			D	A		D	F	
Approach Vol, veh/h					115			1162			2426	
Approach Delay, s/veh					32.1			8.6			50.2	
Approach LOS					C			A			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	9.0	61.0			8.0	62.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	5.0	57.0			4.0	58.0		16.0
Max Q Clear Time (g_c+I1), s	3.3	11.6			2.7	60.0		4.5
Green Ext Time (p_c), s	0.0	11.0			0.0	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	36.6
HCM 2010 LOS	D

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	953	178	266	1092	0	0
Future Volume (veh/h)	953	178	266	1092	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863		
Adj Flow Rate, veh/h	1036	193	289	1187		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	2035	910	774	3185		
Arrive On Green	0.57	0.57	0.22	0.90		
Sat Flow, veh/h	3632	1583	3442	3632		
Grp Volume(v), veh/h	1036	193	289	1187		
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770		
Q Serve(g_s), s	7.0	2.4	2.8	2.0		
Cycle Q Clear(g_c), s	7.0	2.4	2.8	2.0		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2035	910	774	3185		
V/C Ratio(X)	0.51	0.21	0.37	0.37		
Avail Cap(c_a), veh/h	2035	910	774	3185		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.1	4.1	13.1	0.3		
Incr Delay (d2), s/veh	0.9	0.5	1.4	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	3.6	1.2	1.5	1.0		
LnGrp Delay(d),s/veh	6.0	4.6	14.5	0.6		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1229			1476		
Approach Delay, s/veh	5.8			3.3		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			13.0	27.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			9.0	23.0				36.0
Max Q Clear Time (g_c+I1), s			4.8	9.0				4.0
Green Ext Time (p_c), s			0.4	6.8				10.9

Intersection Summary	
HCM 2010 Ctrl Delay	4.5
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1566	85	271	1191	136	0
Future Volume (veh/h)	1566	85	271	1191	136	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	1702	92	295	1295	148	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1809	809	612	2595	315	281
Arrive On Green	0.51	0.51	0.18	0.73	0.18	0.00
Sat Flow, veh/h	3632	1583	3442	3632	1774	1583
Grp Volume(v), veh/h	1702	92	295	1295	148	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770	1774	1583
Q Serve(g_s), s	40.8	2.7	6.9	13.8	6.7	0.0
Cycle Q Clear(g_c), s	40.8	2.7	6.9	13.8	6.7	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1809	809	612	2595	315	281
V/C Ratio(X)	0.94	0.11	0.48	0.50	0.47	0.00
Avail Cap(c_a), veh/h	1809	809	612	2595	315	281
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	20.7	11.4	33.3	5.0	33.2	0.0
Incr Delay (d2), s/veh	11.2	0.3	2.7	0.7	4.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	22.4	1.2	3.5	6.9	3.7	0.0
LnGrp Delay(d),s/veh	31.9	11.7	36.0	5.7	38.1	0.0
LnGrp LOS	C	B	D	A	D	
Approach Vol, veh/h	1794			1590	148	
Approach Delay, s/veh	30.8			11.3	38.1	
Approach LOS	C			B	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	50.0				70.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	46.0				66.0
Max Q Clear Time (g_c+I1), s		8.7	8.9	42.8				15.8
Green Ext Time (p_c), s		0.2	0.6	2.8				14.1

Intersection Summary	
HCM 2010 Ctrl Delay	22.4
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	648	6	84	603	105	5	0	32	76	8	50
Future Volume (veh/h)	0	648	6	84	603	105	5	0	32	76	8	50
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	1863	1863	0	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	704	7	91	655	0	5	0	35	89	0	54
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1243	12	205	1906	853	0	0	0	1092	0	487
Arrive On Green	0.00	0.35	0.35	0.12	0.54	0.00	0.00	0.00	0.00	0.31	0.00	0.31
Sat Flow, veh/h	0	3683	36	1774	3539	1583		0		3548	0	1583
Grp Volume(v), veh/h	0	347	364	91	655	0		0.0		89	0	54
Grp Sat Flow(s),veh/h/ln	0	1770	1856	1774	1770	1583				1774	0	1583
Q Serve(g_s), s	0.0	8.3	8.3	2.5	5.5	0.0				0.9	0.0	1.3
Cycle Q Clear(g_c), s	0.0	8.3	8.3	2.5	5.5	0.0				0.9	0.0	1.3
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	613	643	205	1906	853				1092	0	487
V/C Ratio(X)	0.00	0.57	0.57	0.44	0.34	0.00				0.08	0.00	0.11
Avail Cap(c_a), veh/h	0	613	643	205	1906	853				1092	0	487
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.8	13.8	21.4	6.8	0.0				12.8	0.0	12.9
Incr Delay (d2), s/veh	0.0	3.8	3.6	6.9	0.5	0.0				0.1	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.7	4.9	1.6	2.8	0.0				0.5	0.0	0.6
LnGrp Delay(d),s/veh	0.0	17.6	17.4	28.3	7.3	0.0				12.9	0.0	13.4
LnGrp LOS		B	B	C	A					B		B
Approach Vol, veh/h		711			746						143	
Approach Delay, s/veh		17.5			9.9						13.1	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			10.0	22.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			6.0	18.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			4.5	10.3		3.3		7.5
Green Ext Time (p_c), s			0.0	2.7		0.3		4.5

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	163	654	9	27	959	265	8	2	14	259	6	67
Future Volume (veh/h)	163	654	9	27	959	265	8	2	14	259	6	67
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	177	711	10	29	1042	288	9	2	15	181	148	73
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	177	1161	16	111	1018	455	311	69	336	355	236	116
Arrive On Green	0.10	0.32	0.32	0.13	0.57	0.57	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1774	3573	50	1774	3539	1583	1464	325	1583	1774	1179	581
Grp Volume(v), veh/h	177	352	369	29	1042	288	11	0	15	181	0	221
Grp Sat Flow(s),veh/h/ln	1774	1770	1854	1774	1770	1583	1790	0	1583	1774	0	1760
Q Serve(g_s), s	8.0	13.4	13.4	1.2	23.0	9.7	0.4	0.0	0.6	7.3	0.0	9.2
Cycle Q Clear(g_c), s	8.0	13.4	13.4	1.2	23.0	9.7	0.4	0.0	0.6	7.3	0.0	9.2
Prop In Lane	1.00		0.03	1.00		1.00	0.82		1.00	1.00		0.33
Lane Grp Cap(c), veh/h	177	575	603	111	1018	455	380	0	336	355	0	352
V/C Ratio(X)	1.00	0.61	0.61	0.26	1.02	0.63	0.03	0.00	0.04	0.51	0.00	0.63
Avail Cap(c_a), veh/h	177	575	603	111	1018	455	380	0	336	355	0	352
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	22.8	22.8	33.3	17.0	14.2	25.0	0.0	25.0	28.5	0.0	29.3
Incr Delay (d2), s/veh	67.0	4.8	4.6	5.7	34.5	6.6	0.1	0.0	0.2	5.2	0.0	8.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	7.3	7.6	0.8	15.6	5.0	0.2	0.0	0.3	4.1	0.0	5.3
LnGrp Delay(d),s/veh	103.0	27.6	27.4	39.0	51.5	20.7	25.1	0.0	25.3	33.7	0.0	37.5
LnGrp LOS	F	C	C	D	F	C	C		C	C		D
Approach Vol, veh/h		898			1359			26			402	
Approach Delay, s/veh		42.3			44.7			25.2			35.8	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	30.0		20.0	12.0	27.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	26.0		16.0	8.0	23.0
Max Q Clear Time (g_c+I1), s		2.6	3.2	15.4		11.2	10.0	25.0
Green Ext Time (p_c), s		0.0	0.0	3.3		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	42.4
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	877	275	86	773	165	350	94	137	391	227	357
Future Volume (veh/h)	56	877	275	86	773	165	350	94	137	391	227	357
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	61	953	299	93	840	179	241	297	149	336	372	388
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	138	944	295	99	1180	528	375	393	334	355	373	317
Arrive On Green	0.08	0.36	0.36	0.06	0.33	0.33	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1774	2656	830	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	61	634	618	93	840	179	241	297	149	336	372	388
Grp Sat Flow(s),veh/h/ln	1774	1770	1716	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.0	32.0	32.0	4.7	18.7	7.6	11.2	13.5	7.4	16.8	18.0	18.0
Cycle Q Clear(g_c), s	3.0	32.0	32.0	4.7	18.7	7.6	11.2	13.5	7.4	16.8	18.0	18.0
Prop In Lane	1.00		0.48	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	138	629	610	99	1180	528	375	393	334	355	373	317
V/C Ratio(X)	0.44	1.01	1.01	0.94	0.71	0.34	0.64	0.76	0.45	0.95	1.00	1.23
Avail Cap(c_a), veh/h	138	629	610	99	1180	528	375	393	334	355	373	317
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.6	29.0	29.0	42.4	26.2	22.5	32.4	33.3	30.9	35.5	36.0	36.0
Incr Delay (d2), s/veh	9.9	37.6	39.8	76.3	3.7	1.7	8.3	12.7	4.3	36.1	46.3	126.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	22.1	21.8	4.4	9.7	3.6	6.3	8.3	3.6	11.8	14.0	18.9
LnGrp Delay(d),s/veh	49.6	66.6	68.8	118.6	29.9	24.3	40.7	46.0	35.2	71.6	82.3	162.2
LnGrp LOS	D	F	F	F	C	C	D	D	D	E	F	F
Approach Vol, veh/h		1313			1112			687			1096	
Approach Delay, s/veh		66.9			36.4			41.8			107.3	
Approach LOS		E			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.0	9.0	36.0		22.0	11.0	34.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		19.0	5.0	32.0		18.0	7.0	30.0
Max Q Clear Time (g_c+I1), s		15.5	6.7	34.0		20.0	5.0	20.7
Green Ext Time (p_c), s		1.1	0.0	0.0		0.0	0.0	4.3

Intersection Summary	
HCM 2010 Ctrl Delay	65.3
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	21	73	6	6	80	9	3	2	7	0	0	0
Future Vol, veh/h	21	73	6	6	80	9	3	2	7	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	23	79	7	7	87	10	3	2	8	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.6	7.5	7.1
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	25%	21%	6%
Vol Thru, %	17%	73%	84%
Vol Right, %	58%	6%	9%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	12	100	95
LT Vol	3	21	6
Through Vol	2	73	80
RT Vol	7	6	9
Lane Flow Rate	13	109	103
Geometry Grp	1	1	1
Degree of Util (X)	0.014	0.122	0.115
Departure Headway (Hd)	3.996	4.041	3.995
Convergence, Y/N	Yes	Yes	Yes
Cap	881	887	897
Service Time	2.086	2.064	2.02
HCM Lane V/C Ratio	0.015	0.123	0.115
HCM Control Delay	7.1	7.6	7.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.4	0.4

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	166	48	26	30	0	0	0	0	25	0	40
Future Vol, veh/h	0	166	48	26	30	0	0	0	0	25	0	40
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	180	52	28	33	0	0	0	0	27	0	43

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	180	0	0			269	269	33
Stage 1	-	-	-	-	-	-			89	89	-
Stage 2	-	-	-	-	-	-			180	180	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1396	-	0			720	637	1041
Stage 1	0	-	-	-	-	0			934	821	-
Stage 2	0	-	-	-	-	0			851	750	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1396	-	-			706	0	1041
Mov Cap-2 Maneuver	-	-	-	-	-	-			706	0	-
Stage 1	-	-	-	-	-	-			915	0	-
Stage 2	-	-	-	-	-	-			851	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	3.5	9.3
HCM LOS			A

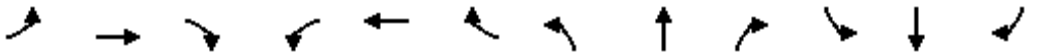
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1396	-	706	1041
HCM Lane V/C Ratio	-	-	0.02	-	0.038	0.042
HCM Control Delay (s)	-	-	7.6	0	10.3	8.6
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	715	99	160	1235	40	244
Future Volume (veh/h)	715	99	160	1235	40	244
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	777	0	174	1342	43	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	2124	950	306	1366	315	495
Arrive On Green	0.60	0.00	0.09	0.73	0.18	0.00
Sat Flow, veh/h	3632	1583	3442	1863	1774	2787
Grp Volume(v), veh/h	777	0	174	1342	43	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1863	1774	1393
Q Serve(g_s), s	10.1	0.0	4.4	61.8	1.8	0.0
Cycle Q Clear(g_c), s	10.1	0.0	4.4	61.8	1.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	2124	950	306	1366	315	495
V/C Ratio(X)	0.37	0.00	0.57	0.98	0.14	0.00
Avail Cap(c_a), veh/h	2124	950	306	1366	315	495
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	9.2	0.0	39.3	11.4	31.2	0.0
Incr Delay (d2), s/veh	0.5	0.0	7.5	20.5	0.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.0	0.0	2.4	38.7	1.0	0.0
LnGrp Delay(d),s/veh	9.7	0.0	46.8	31.9	32.1	0.0
LnGrp LOS	A		D	C	C	
Approach Vol, veh/h	777			1516	43	
Approach Delay, s/veh	9.7			33.7	32.1	
Approach LOS	A			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	12.0	58.0				70.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	8.0	54.0				66.0
Max Q Clear Time (g_c+I1), s		3.8	6.4	12.1				63.8
Green Ext Time (p_c), s		0.0	0.1	6.5				1.9

Intersection Summary	
HCM 2010 Ctrl Delay	25.7
HCM 2010 LOS	C

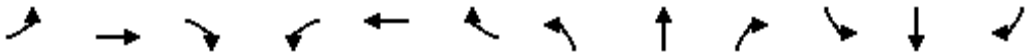
Appendix I.2 – Analysis Output Sheets (Future No Project Existing SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	91	87	60	98	323	629	168	18	148	92	24	71
Future Volume (vph)	91	87	60	98	323	629	168	18	148	92	24	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3139	1441		1782	1583		1792	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3139	1441		1782	1583		1792	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	99	95	65	107	351	684	183	20	161	100	26	77
RTOR Reduction (vph)	0	0	55	0	233	274	0	0	116	0	0	60
Lane Group Flow (vph)	99	95	10	107	460	68	0	203	45	0	126	17
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.4	11.0	11.0	5.4	14.6	14.6		20.4	20.4		16.1	16.1
Effective Green, g (s)	5.4	11.0	11.0	5.4	14.6	14.6		20.4	20.4		16.1	16.1
Actuated g/C Ratio	0.07	0.15	0.15	0.07	0.20	0.20		0.28	0.28		0.22	0.22
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	129	278	236	129	621	285		493	438		391	345
v/s Ratio Prot	0.06	0.05		c0.06	c0.15			c0.11			c0.07	
v/s Ratio Perm			0.01			0.05			0.03			0.01
v/c Ratio	0.77	0.34	0.04	0.83	0.74	0.24		0.41	0.10		0.32	0.05
Uniform Delay, d1	33.5	28.1	26.8	33.7	27.8	24.9		21.8	19.8		24.2	22.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	23.5	0.3	0.0	33.6	4.1	0.2		2.5	0.5		2.2	0.3
Delay (s)	57.0	28.4	26.9	67.3	31.9	25.0		24.3	20.3		26.4	23.0
Level of Service	E	C	C	E	C	C		C	C		C	C
Approach Delay (s)		38.9			33.2			22.5			25.1	
Approach LOS		D			C			C			C	

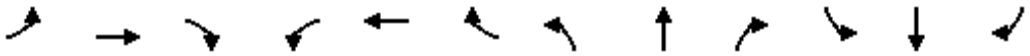
Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	73.7	Sum of lost time (s)	20.8
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	2	359	0	299	1	128	408	95	119	0
Future Volume (vph)	0	0	2	359	0	299	1	128	408	95	119	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6		4.6	4.6	4.0		4.6	4.0		4.6	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95	1.00		0.95	
Frt		0.86		1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00		0.95	0.95	1.00		1.00	1.00		0.98	
Satd. Flow (prot)		1611		1681	1681	1583		3538	1583		3462	
Flt Permitted		1.00		0.95	0.95	1.00		1.00	1.00		0.98	
Satd. Flow (perm)		1611		1681	1681	1583		3538	1583		3462	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	2	390	0	325	1	139	443	103	129	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	195	195	325	0	140	443	0	232	0
Turn Type		NA		Split	NA	Free	Split	NA	Free	Split	NA	
Protected Phases		4		8	8		2	2		6	6	
Permitted Phases	4					Free			Free			
Actuated Green, G (s)		0.9		12.8	12.8	68.7		18.4	68.7		18.2	
Effective Green, g (s)		0.9		12.8	12.8	68.7		18.4	68.7		18.2	
Actuated g/C Ratio		0.01		0.19	0.19	1.00		0.27	1.00		0.26	
Clearance Time (s)		4.6		4.6	4.6			4.6			4.6	
Vehicle Extension (s)		3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		21		313	313	1583		947	1583		917	
v/s Ratio Prot		0.00		c0.12	0.12			0.04			0.07	
v/s Ratio Perm						0.21			c0.28			
v/c Ratio		0.00		0.62	0.62	0.21		0.15	0.28		0.25	
Uniform Delay, d1		33.5		25.7	25.7	0.0		19.2	0.0		19.9	
Progression Factor		1.00		1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.0		3.8	3.8	0.3		0.3	0.4		0.7	
Delay (s)		33.5		29.6	29.6	0.3		19.5	0.4		20.6	
Level of Service		C		C	C	A		B	A		C	
Approach Delay (s)		33.5			16.3			5.0			20.6	
Approach LOS		C			B			A			C	

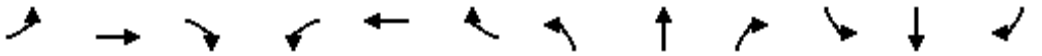
Intersection Summary			
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	68.7	Sum of lost time (s)	18.4
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		
Description: SR-76 & Coast Hwy			
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	60	13	45	77	77	41	59	66	115	81	17
Future Volume (vph)	6	60	13	45	77	77	41	59	66	115	81	17
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	65	14	49	84	84	45	64	72	125	88	18

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	86	217	181	231
Volume Left (vph)	7	49	45	125
Volume Right (vph)	14	84	72	18
Hadj (s)	-0.05	-0.15	-0.15	0.10
Departure Headway (s)	5.2	4.9	4.9	5.0
Degree Utilization, x	0.12	0.30	0.24	0.32
Capacity (veh/h)	616	674	687	671
Control Delay (s)	9.0	10.0	9.4	10.4
Approach Delay (s)	9.0	10.0	9.4	10.4
Approach LOS	A	A	A	B

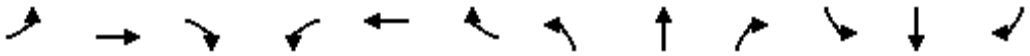
Intersection Summary				
Delay	9.8			
Level of Service	A			
Intersection Capacity Utilization	47.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	13	23	7	24	51	22	124	15	20	170	50
Future Volume (vph)	87	13	23	7	24	51	22	124	15	20	170	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.92		1.00	0.98		1.00	0.97	
Flt Protected		0.96	1.00		1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1785	1583		1700		1770	3483		1770	3419	
Flt Permitted		0.73	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1354	1583		1676		1770	3483		1770	3419	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	14	25	8	26	55	24	135	16	22	185	54
RTOR Reduction (vph)	0	0	21	0	46	0	0	7	0	0	22	0
Lane Group Flow (vph)	0	109	4	0	43	0	24	144	0	22	217	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		12.8	12.8		12.8		11.7	41.4		10.0	44.5	
Effective Green, g (s)		12.8	12.8		12.8		11.7	41.4		10.0	44.5	
Actuated g/C Ratio		0.17	0.17		0.17		0.16	0.55		0.13	0.59	
Clearance Time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		3.0	7.0	
Lane Grp Cap (vph)		231	270		286		276	1922		236	2028	
v/s Ratio Prot							c0.01	0.04		0.01	c0.06	
v/s Ratio Perm		c0.08	0.00		0.03							
v/c Ratio		0.47	0.02		0.15		0.09	0.07		0.09	0.11	
Uniform Delay, d1		28.1	25.9		26.5		27.1	7.9		28.5	6.6	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.3	0.1		0.9		0.1	0.1		0.2	0.1	
Delay (s)		33.4	25.9		27.4		27.2	7.9		28.7	6.7	
Level of Service		C	C		C		C	A		C	A	
Approach Delay (s)		32.0			27.4			10.6			8.6	
Approach LOS		C			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.18		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.8
Intersection Capacity Utilization	32.5%	ICU Level of Service	A
Analysis Period (min)	15		

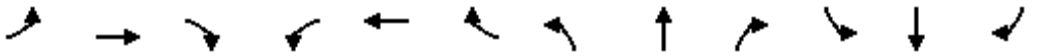
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	9	9	15	13	15	7	120	19	43	142	13
Future Volume (vph)	13	9	9	15	13	15	7	120	19	43	142	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frt	1.00	0.93		1.00	0.92			0.98			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.99	
Satd. Flow (prot)	1770	1723		1770	1714			3460			3467	
Flt Permitted	0.74	1.00		0.74	1.00			0.94			0.86	
Satd. Flow (perm)	1374	1723		1386	1714			3244			3001	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	14	10	10	16	14	16	8	130	21	47	154	14
RTOR Reduction (vph)	0	4	0	0	6	0	0	17	0	0	11	0
Lane Group Flow (vph)	14	16	0	16	24	0	0	142	0	0	204	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	30.7	30.7		30.7	30.7			10.5			10.5	
Effective Green, g (s)	30.7	30.7		30.7	30.7			10.5			10.5	
Actuated g/C Ratio	0.61	0.61		0.61	0.61			0.21			0.21	
Clearance Time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	843	1057		851	1052			681			630	
v/s Ratio Prot		0.01			c0.01							
v/s Ratio Perm	0.01			0.01				0.04			c0.07	
v/c Ratio	0.02	0.02		0.02	0.02			0.21			0.32	
Uniform Delay, d1	3.8	3.8		3.8	3.8			16.3			16.7	
Progression Factor	1.00	1.00		1.00	1.00			0.76			1.00	
Incremental Delay, d2	0.0	0.0		0.0	0.0			0.2			0.4	
Delay (s)	3.8	3.8		3.8	3.8			12.7			17.2	
Level of Service	A	A		A	A			B			B	
Approach Delay (s)		3.8			3.8			12.7			17.2	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		

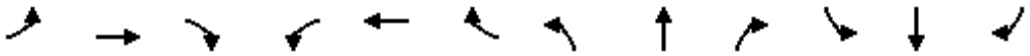
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	14	12	15	21	22	9	142	16	16	154	23
Future Volume (vph)	8	14	12	15	21	22	9	142	16	16	154	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00			1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00			1.00	
Frt	1.00	0.93		1.00	0.92			0.99			0.98	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1746	1716		1754	1697			3469			3443	
Flt Permitted	0.73	1.00		0.74	1.00			0.93			0.92	
Satd. Flow (perm)	1335	1716		1364	1697			3226			3176	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	15	13	16	23	24	10	154	17	17	167	25
RTOR Reduction (vph)	0	5	0	0	9	0	0	14	0	0	21	0
Lane Group Flow (vph)	9	23	0	16	38	0	0	167	0	0	188	0
Confl. Peds. (#/hr)	16		11	11		16	10		17	17		10
Confl. Bikes (#/hr)			2			2						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	32.5	32.5		31.7	31.7			8.3			8.8	
Effective Green, g (s)	32.5	32.5		31.7	31.7			8.3			8.8	
Actuated g/C Ratio	0.65	0.65		0.63	0.63			0.17			0.18	
Clearance Time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Vehicle Extension (s)	3.0	3.0		3.5	3.5			3.0			3.5	
Lane Grp Cap (vph)	867	1115		864	1075			535			558	
v/s Ratio Prot		0.01			c0.02							
v/s Ratio Perm	0.01			0.01				0.05			c0.06	
v/c Ratio	0.01	0.02		0.02	0.04			0.31			0.34	
Uniform Delay, d1	3.1	3.1		3.4	3.4			18.3			18.0	
Progression Factor	1.00	1.00		1.00	1.00			1.84			0.75	
Incremental Delay, d2	0.0	0.0		0.0	0.1			0.3			0.4	
Delay (s)	3.1	3.1		3.4	3.5			34.1			13.9	
Level of Service	A	A		A	A			C			B	
Approach Delay (s)		3.1			3.5			34.1			13.9	
Approach LOS		A			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	7	25	25	13	8	115	230	9	11	158	9
Future Volume (vph)	3	7	25	25	13	8	115	230	9	11	158	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	8	27	27	14	9	125	250	10	12	172	10

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	11	27	50	250	135	98	96
Volume Left (vph)	3	0	27	125	0	12	0
Volume Right (vph)	0	27	9	0	10	0	10
Hadj (s)	0.17	-0.67	0.03	0.28	-0.02	0.10	-0.04
Departure Headway (s)	6.1	5.2	5.9	5.2	4.9	5.2	5.1
Degree Utilization, x	0.02	0.04	0.08	0.36	0.18	0.14	0.14
Capacity (veh/h)	541	624	565	677	714	666	685
Control Delay (s)	8.0	7.2	9.4	9.9	7.8	7.9	7.7
Approach Delay (s)	7.5		9.4	9.2		7.8	
Approach LOS	A		A	A		A	

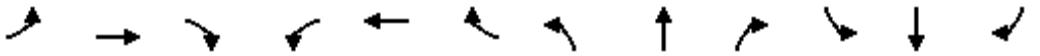
Intersection Summary				
Delay	8.7			
Level of Service	A			
Intersection Capacity Utilization	34.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	128	58	139	89	34	122
Future Volume (vph)	128	58	139	89	34	122
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	139	63	151	97	37	133

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	139	63	248	170
Volume Left (vph)	139	0	0	37
Volume Right (vph)	0	63	97	0
Hadj (s)	0.53	-0.67	-0.20	0.08
Departure Headway (s)	6.0	4.8	4.5	4.8
Degree Utilization, x	0.23	0.08	0.31	0.23
Capacity (veh/h)	562	697	770	706
Control Delay (s)	9.6	7.1	9.5	9.3
Approach Delay (s)	8.8		9.5	9.3
Approach LOS	A		A	A

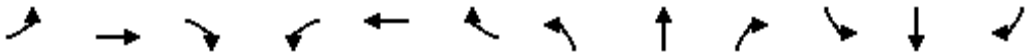
Intersection Summary			
Delay	9.2		
Level of Service	A		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	122	35	163	35	0	0	0	0	31	42
Future Volume (vph)	18	0	122	35	163	35	0	0	0	0	31	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0						4.0	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.91	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3445						3234	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3445						3234	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	0	133	38	177	38	0	0	0	0	34	46
RTOR Reduction (vph)	0	0	124	32	32	0	0	0	0	0	21	0
Lane Group Flow (vph)	20	0	9	6	183	0	0	0	0	0	59	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	3.2		3.2	8.1	8.1						26.7	
Effective Green, g (s)	3.2		3.2	8.1	8.1						26.7	
Actuated g/C Ratio	0.06		0.06	0.16	0.16						0.53	
Clearance Time (s)	4.0		4.0	4.0	4.0						4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	113		178	286	558						1726	
v/s Ratio Prot	c0.01		0.00	0.00	c0.05						c0.02	
v/s Ratio Perm												
v/c Ratio	0.18		0.05	0.02	0.33						0.03	
Uniform Delay, d1	22.2		22.0	17.6	18.5						5.5	
Progression Factor	1.00		1.00	1.00	1.15						1.00	
Incremental Delay, d2	0.8		0.1	0.0	0.3						0.0	
Delay (s)	22.9		22.1	17.6	21.6						5.6	
Level of Service	C		C	B	C						A	
Approach Delay (s)		22.2			21.0			0.0			5.6	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	22.3%	ICU Level of Service	A
Analysis Period (min)	15		

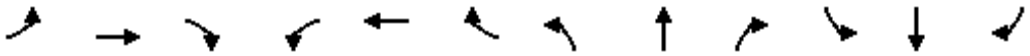
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	122	213	60	57	256	0	0	146	25
Future Volume (vph)	0	0	0	122	213	60	57	256	0	0	146	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.0	5.0		5.0	5.0			5.0	
Lane Util. Factor				1.00	0.95		1.00	0.95			0.95	
Frpb, ped/bikes				1.00	1.00		1.00	1.00			1.00	
Flpb, ped/bikes				0.99	1.00		1.00	1.00			1.00	
Frt				1.00	0.97		1.00	1.00			0.98	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1753	3408		1770	3539			3449	
Flt Permitted				0.95	1.00		0.63	1.00			1.00	
Satd. Flow (perm)				1753	3408		1182	3539			3449	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	133	232	65	62	278	0	0	159	27
RTOR Reduction (vph)	0	0	0	0	28	0	0	0	0	0	21	0
Lane Group Flow (vph)	0	0	0	133	269	0	62	278	0	0	165	0
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					8			2			6	
Permitted Phases				8			2					
Actuated Green, G (s)				28.7	28.7		11.3	11.3			11.3	
Effective Green, g (s)				28.7	28.7		11.3	11.3			11.3	
Actuated g/C Ratio				0.57	0.57		0.23	0.23			0.23	
Clearance Time (s)				5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)				3.0	3.0		4.0	4.0			4.0	
Lane Grp Cap (vph)				1006	1956		267	799			779	
v/s Ratio Prot					c0.08			c0.08			0.05	
v/s Ratio Perm				0.08			0.05					
v/c Ratio				0.13	0.14		0.23	0.35			0.21	
Uniform Delay, d1				4.9	4.9		15.8	16.3			15.7	
Progression Factor				1.00	1.00		1.00	1.00			1.23	
Incremental Delay, d2				0.3	0.1		0.6	0.4			0.2	
Delay (s)				5.2	5.1		16.4	16.6			19.6	
Level of Service				A	A		B	B			B	
Approach Delay (s)		0.0			5.1			16.6			19.6	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.20		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	119	1	144	448	215	12	27	217	144	54	7
Future Volume (vph)	24	119	1	144	448	215	12	27	217	144	54	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3535		1770	3539	1583		1834	1583	1681	1716	
Flt Permitted	0.47	1.00		0.67	1.00	1.00		0.88	1.00	0.73	0.85	
Satd. Flow (perm)	884	3535		1247	3539	1583		1644	1583	1291	1489	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	129	1	157	487	234	13	29	236	157	59	8
RTOR Reduction (vph)	0	1	0	0	0	133	0	0	176	0	6	0
Lane Group Flow (vph)	26	129	0	157	487	101	0	42	60	110	108	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	13.5	13.5		13.1	13.1	13.1		7.7	7.7	7.7	7.7	
Effective Green, g (s)	13.5	13.5		13.1	13.1	13.1		7.7	7.7	7.7	7.7	
Actuated g/C Ratio	0.44	0.44		0.43	0.43	0.43		0.25	0.25	0.25	0.25	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	392	1569		537	1525	682		416	400	326	377	
v/s Ratio Prot		0.04			c0.14							
v/s Ratio Perm	0.03			0.13		0.06		0.03	0.04	c0.09	0.07	
v/c Ratio	0.07	0.08		0.29	0.32	0.15		0.10	0.15	0.34	0.29	
Uniform Delay, d1	4.8	4.9		5.6	5.7	5.3		8.7	8.8	9.3	9.1	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.0		0.4	0.1	0.1		0.1	0.2	0.8	0.6	
Delay (s)	4.9	4.9		6.0	5.9	5.4		8.8	9.0	10.1	9.7	
Level of Service	A	A		A	A	A		A	A	B	A	
Approach Delay (s)		4.9			5.8			9.0			9.9	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	6.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	30.4	Sum of lost time (s)	9.6
Intersection Capacity Utilization	39.8%	ICU Level of Service	A
Analysis Period (min)	15		

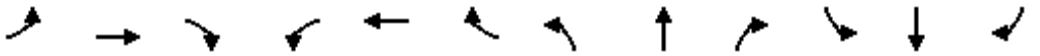
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	122	16	54	43	14	21
Future Volume (Veh/h)	122	16	54	43	14	21
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	133	17	59	47	15	23
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			150		306	142
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			150		306	142
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		98	97
cM capacity (veh/h)			1431		657	906

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	150	106	38
Volume Left	0	59	15
Volume Right	17	0	23
cSH	1700	1431	788
Volume to Capacity	0.09	0.04	0.05
Queue Length 95th (ft)	0	3	4
Control Delay (s)	0.0	4.4	9.8
Lane LOS		A	A
Approach Delay (s)	0.0	4.4	9.8
Approach LOS			A

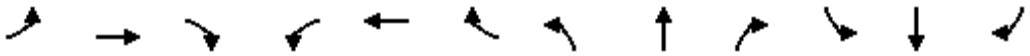
Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	26.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	57	93	0	0	0	26	126	59	69	122	50
Future Volume (vph)	86	57	93	0	0	0	26	126	59	69	122	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00					1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98					1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00					1.00	1.00		1.00	1.00	
Frt	1.00	0.91					1.00	0.95		1.00	0.96	
Flt Protected	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1656					1770	3348		1770	3345	
Flt Permitted	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1656					1770	3348		1770	3345	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	62	101	0	0	0	28	137	64	75	133	54
RTOR Reduction (vph)	0	68	0	0	0	0	0	52	0	0	34	0
Lane Group Flow (vph)	93	95	0	0	0	0	28	149	0	75	153	0
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA		Prot	NA	
Protected Phases	4	4					5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	18.0	18.0					4.0	10.4		13.6	20.0	
Effective Green, g (s)	18.0	18.0					4.0	10.4		13.6	20.0	
Actuated g/C Ratio	0.33	0.33					0.07	0.19		0.25	0.36	
Clearance Time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0					3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	579	541					128	633		437	1216	
v/s Ratio Prot	0.05	c0.06					0.02	c0.04		c0.04	0.05	
v/s Ratio Perm												
v/c Ratio	0.16	0.18					0.22	0.24		0.17	0.13	
Uniform Delay, d1	13.1	13.2					24.0	18.9		16.3	11.7	
Progression Factor	1.00	1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.7					3.9	0.9		0.9	0.2	
Delay (s)	13.7	13.9					27.9	19.8		17.1	11.9	
Level of Service	B	B					C	B		B	B	
Approach Delay (s)		13.8			0.0			20.8			13.4	
Approach LOS		B			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	44.7%	ICU Level of Service	A
Analysis Period (min)	15		

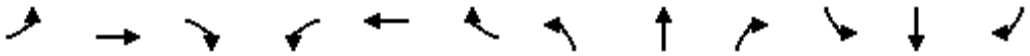
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	200	9	0	0	0	0	4	15	23	8	0
Future Volume (Veh/h)	12	200	9	0	0	0	0	4	15	23	8	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	217	10	0	0	0	0	4	16	25	9	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			227			252	248	114	152	253	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			227			252	248	114	152	253	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	98	97	99	100
cM capacity (veh/h)	1622			1339			669	648	918	777	644	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	122	118	20	34
Volume Left	13	0	0	25
Volume Right	0	10	16	0
cSH	1622	1700	847	737
Volume to Capacity	0.01	0.07	0.02	0.05
Queue Length 95th (ft)	1	0	2	4
Control Delay (s)	0.8	0.0	9.4	10.1
Lane LOS	A		A	B
Approach Delay (s)	0.4		9.4	10.1
Approach LOS			A	B

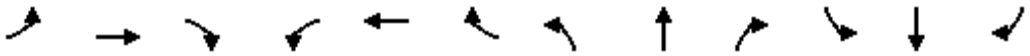
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	21.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	44	353	5	0	0	0	0	8	16	19	26	0
Future Volume (vph)	44	353	5	0	0	0	0	8	16	19	26	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	48	384	5	0	0	0	0	9	17	21	28	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	240	197	26	49
Volume Left (vph)	48	0	0	21
Volume Right (vph)	0	5	17	0
Hadj (s)	0.13	0.02	-0.36	0.12
Departure Headway (s)	4.8	4.7	4.6	5.0
Degree Utilization, x	0.32	0.26	0.03	0.07
Capacity (veh/h)	736	750	735	671
Control Delay (s)	8.9	8.1	7.7	8.4
Approach Delay (s)	8.6		7.7	8.4
Approach LOS	A		A	A

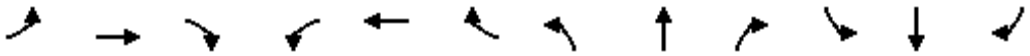
Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	26.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	57	191	10	44	0	59	0	38	33	0	0	0
Future Volume (vph)	57	191	10	44	0	59	0	38	33	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	208	11	48	0	64	0	41	36	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	62	219	112	77
Volume Left (vph)	62	0	48	0
Volume Right (vph)	0	11	64	36
Hadj (s)	0.53	0.00	-0.22	-0.25
Departure Headway (s)	5.3	4.8	4.3	4.5
Degree Utilization, x	0.09	0.29	0.13	0.10
Capacity (veh/h)	667	738	812	736
Control Delay (s)	7.6	8.5	7.9	8.0
Approach Delay (s)	8.3		7.9	8.0
Approach LOS	A		A	A

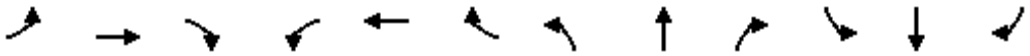
Intersection Summary				
Delay	8.2			
Level of Service	A			
Intersection Capacity Utilization	30.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	2	25	20	6	18	25	126	12	8	131	11
Future Volume (Veh/h)	15	2	25	20	6	18	25	126	12	8	131	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	2	27	22	7	20	27	137	13	9	142	12
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			414	
pX, platoon unblocked												
vC, conflicting volume	320	384	84	322	384	83	161			157		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	320	384	84	322	384	83	161			157		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	97	96	99	98	98			99		
cM capacity (veh/h)	570	528	953	569	528	953	1407			1412		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	45	49	96	82	80	83
Volume Left	16	22	27	0	9	0
Volume Right	27	20	0	13	0	12
cSH	748	672	1407	1700	1412	1700
Volume to Capacity	0.06	0.07	0.02	0.05	0.01	0.05
Queue Length 95th (ft)	5	6	1	0	0	0
Control Delay (s)	10.1	10.8	2.3	0.0	0.9	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	10.1	10.8	1.2		0.4	
Approach LOS	B	B				

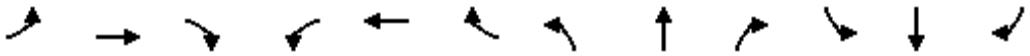
Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	26.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1	13	3	0	3	10	140	8	2	146	10
Future Volume (Veh/h)	8	1	13	3	0	3	10	140	8	2	146	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	1	14	3	0	3	11	152	9	2	159	11
Pedestrians		11			7						12	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								831			844	
pX, platoon unblocked												
vC, conflicting volume	292	370	96	284	370	100	181			168		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	292	370	96	284	370	100	181			168		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	98	100	100	100	99			100		
cM capacity (veh/h)	612	545	933	621	544	922	1379			1399		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	24	6	87	85	82	90
Volume Left	9	3	11	0	2	0
Volume Right	14	3	0	9	0	11
cSH	761	742	1379	1700	1399	1700
Volume to Capacity	0.03	0.01	0.01	0.05	0.00	0.05
Queue Length 95th (ft)	2	1	1	0	0	0
Control Delay (s)	9.9	9.9	1.0	0.0	0.2	0.0
Lane LOS	A	A	A		A	
Approach Delay (s)	9.9	9.9	0.5		0.1	
Approach LOS	A	A				

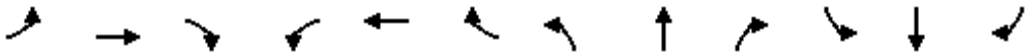
Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	25.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	55	64	57	23	8	71	10	150	36	84	102	2
Future Volume (vph)	55	64	57	23	8	71	10	150	36	84	102	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	60	70	62	25	9	77	11	163	39	91	111	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	192	111	213	204
Volume Left (vph)	60	25	11	91
Volume Right (vph)	62	77	39	2
Hadj (s)	-0.10	-0.34	-0.07	0.12
Departure Headway (s)	5.0	4.9	4.9	5.1
Degree Utilization, x	0.27	0.15	0.29	0.29
Capacity (veh/h)	656	654	684	657
Control Delay (s)	9.9	8.8	9.9	10.1
Approach Delay (s)	9.9	8.8	9.9	10.1
Approach LOS	A	A	A	B

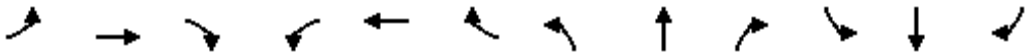
Intersection Summary				
Delay	9.8			
Level of Service	A			
Intersection Capacity Utilization	45.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	120	12	2	55	15	6	17	15	20	24	10
Future Volume (Veh/h)	7	120	12	2	55	15	6	17	15	20	24	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	130	13	2	60	16	7	18	16	22	26	11
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	90			150			256	254	144	264	252	83
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	90			150			256	254	144	264	252	83
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			99	97	98	97	96	99
cM capacity (veh/h)	1488			1423			651	634	899	643	636	964

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	151	78	41	59
Volume Left	8	2	7	22
Volume Right	13	16	16	11
cSH	1488	1423	720	682
Volume to Capacity	0.01	0.00	0.06	0.09
Queue Length 95th (ft)	0	0	5	7
Control Delay (s)	0.4	0.2	10.3	10.8
Lane LOS	A	A	B	B
Approach Delay (s)	0.4	0.2	10.3	10.8
Approach LOS			B	B

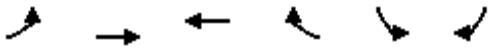
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	23.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	53	88	95	28	29	43	115	68	18	127	11
Future Volume (vph)	34	53	88	95	28	29	43	115	68	18	127	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.91			0.97		1.00	0.94		1.00	0.99	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1689			1759		1770	3342		1770	3497	
Flt Permitted	0.78	1.00			0.72		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1459	1689			1308		1770	3342		1770	3497	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	58	96	103	30	32	47	125	74	20	138	12
RTOR Reduction (vph)	0	81	0	0	18	0	0	40	0	0	7	0
Lane Group Flow (vph)	37	73	0	0	147	0	47	159	0	20	143	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	5.7	5.7			5.7		1.7	16.5		0.6	15.4	
Effective Green, g (s)	5.7	5.7			5.7		1.7	16.5		0.6	15.4	
Actuated g/C Ratio	0.16	0.16			0.16		0.05	0.46		0.02	0.43	
Clearance Time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	232	268			208		84	1540		29	1504	
v/s Ratio Prot		0.04					c0.03	c0.05		0.01	0.04	
v/s Ratio Perm	0.03				c0.11							
v/c Ratio	0.16	0.27			0.70		0.56	0.10		0.69	0.10	
Uniform Delay, d1	13.0	13.2			14.3		16.7	5.5		17.5	6.1	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.6			10.3		7.9	0.0		51.3	0.0	
Delay (s)	13.3	13.8			24.6		24.5	5.5		68.8	6.1	
Level of Service	B	B			C		C	A		E	A	
Approach Delay (s)		13.7			24.6			9.1			13.5	
Approach LOS		B			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	35.8	Sum of lost time (s)	13.0
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

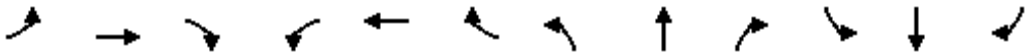
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	202	195	12	38	34
Future Volume (Veh/h)	19	202	195	12	38	34
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	220	212	13	41	37
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	233				490	228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	233				490	228
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				92	95
cM capacity (veh/h)	1326				525	806

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	241	225	78
Volume Left	21	0	41
Volume Right	0	13	37
cSH	1326	1700	629
Volume to Capacity	0.02	0.13	0.12
Queue Length 95th (ft)	1	0	11
Control Delay (s)	0.8	0.0	11.5
Lane LOS	A		B
Approach Delay (s)	0.8	0.0	11.5
Approach LOS			B

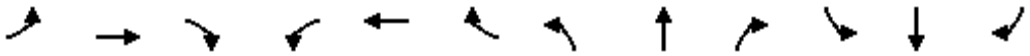
Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	37.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	203	9	20	192	9	6	4	13	29	1	5
Future Volume (Veh/h)	6	203	9	20	192	9	6	4	13	29	1	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	221	10	22	209	10	7	4	14	32	1	5
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	221			231			506	505	226	516	505	218
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	221			231			506	505	226	516	505	218
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			98	99	98	93	100	99
cM capacity (veh/h)	1346			1337			464	459	813	450	459	819

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	238	241	25	38
Volume Left	7	22	7	32
Volume Right	10	10	14	5
cSH	1346	1337	610	478
Volume to Capacity	0.01	0.02	0.04	0.08
Queue Length 95th (ft)	0	1	3	6
Control Delay (s)	0.3	0.8	11.2	13.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	11.2	13.2
Approach LOS			B	B

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	32.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	103	180	65	131	0	97	0	33	0	2	0
Future Volume (vph)	0	103	180	65	131	0	97	0	33	0	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	112	196	71	142	0	105	0	36	0	2	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	308	213	141	2
Volume Left (vph)	0	71	105	0
Volume Right (vph)	196	0	36	0
Hadj (s)	-0.35	0.10	0.03	0.03
Departure Headway (s)	4.2	4.7	5.1	5.3
Degree Utilization, x	0.36	0.28	0.20	0.00
Capacity (veh/h)	828	728	647	588
Control Delay (s)	9.5	9.5	9.4	8.4
Approach Delay (s)	9.5	9.5	9.4	8.4
Approach LOS	A	A	A	A

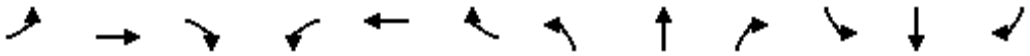
Intersection Summary				
Delay	9.5			
Level of Service	A			
Intersection Capacity Utilization	51.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	48	65	99	30	77	119
Future Volume (vph)	48	65	99	30	77	119
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	71	108	33	84	129

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	123	141	213
Volume Left (vph)	52	0	84
Volume Right (vph)	71	33	0
Hadj (s)	-0.23	-0.11	0.11
Departure Headway (s)	4.5	4.3	4.5
Degree Utilization, x	0.15	0.17	0.26
Capacity (veh/h)	743	797	775
Control Delay (s)	8.3	8.2	9.1
Approach Delay (s)	8.3	8.2	9.1
Approach LOS	A	A	A

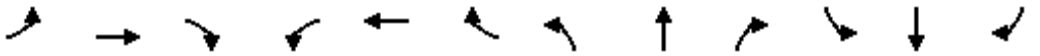
Intersection Summary			
Delay	8.6		
Level of Service	A		
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	211	2	11	170	50	11	15	20	50	24	11
Future Volume (Veh/h)	9	211	2	11	170	50	11	15	20	50	24	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	229	2	12	185	54	12	16	22	54	26	12
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.94						0.94	0.94		0.94	0.94	0.94
vC, conflicting volume	242			242			526	527	249	527	501	219
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	159			242			462	463	249	463	435	134
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	96	97	88	94	99
cM capacity (veh/h)	1329			1312			437	452	777	438	469	853

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	241	251	50	92
Volume Left	10	12	12	54
Volume Right	2	54	22	12
cSH	1329	1312	549	477
Volume to Capacity	0.01	0.01	0.09	0.19
Queue Length 95th (ft)	1	1	7	18
Control Delay (s)	0.4	0.5	12.2	14.3
Lane LOS	A	A	B	B
Approach Delay (s)	0.4	0.5	12.2	14.3
Approach LOS			B	B

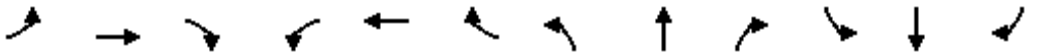
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	33.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	120	69	86	121	70	36	159	46	76	201	14
Future Volume (vph)	19	120	69	86	121	70	36	159	46	76	201	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	0.96	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1850	1534	1681	1764	1522	1770	3407		1770	3491	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1850	1534	1681	1764	1522	1770	3407		1770	3491	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	130	75	93	132	76	39	173	50	83	218	15
RTOR Reduction (vph)	0	0	65	0	0	65	0	31	0	0	5	0
Lane Group Flow (vph)	0	151	10	84	141	11	39	192	0	83	228	0
Confl. Peds. (#/hr)	14		10	10		14			3			15
Confl. Bikes (#/hr)			4			5			3			3
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		10.9	10.9	12.1	12.1	12.1	6.0	26.8		11.4	32.2	
Effective Green, g (s)		10.9	10.9	12.1	12.1	12.1	6.0	26.8		11.4	32.2	
Actuated g/C Ratio		0.14	0.14	0.15	0.15	0.15	0.08	0.34		0.14	0.40	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.5		2.0	3.5	
Lane Grp Cap (vph)		252	209	254	266	230	132	1141		252	1405	
v/s Ratio Prot		c0.08		0.05	c0.08		0.02	0.06		c0.05	c0.07	
v/s Ratio Perm			0.01			0.01						
v/c Ratio		0.60	0.05	0.33	0.53	0.05	0.30	0.17		0.33	0.16	
Uniform Delay, d1		32.5	30.0	30.3	31.3	29.0	35.0	18.7		30.9	15.3	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.5	0.0	0.9	2.3	0.1	0.5	0.3		0.3	0.2	
Delay (s)		35.0	30.1	31.2	33.6	29.1	35.5	19.1		31.1	15.5	
Level of Service		D	C	C	C	C	D	B		C	B	
Approach Delay (s)		33.4			31.8			21.5			19.6	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

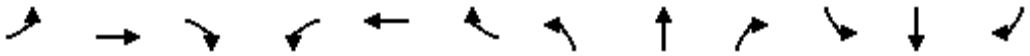
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	281	0	27	362	77	13	11	57	238	17	43
Future Volume (vph)	11	281	0	27	362	77	13	11	57	238	17	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1770	3539		1754	3436			3104			1778	1527
Flt Permitted	0.38	1.00		0.57	1.00			0.91			0.67	1.00
Satd. Flow (perm)	717	3539		1045	3436			2852			1254	1527
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	305	0	29	393	84	14	12	62	259	18	47
RTOR Reduction (vph)	0	0	0	0	44	0	0	25	0	0	0	19
Lane Group Flow (vph)	12	305	0	29	433	0	0	63	0	0	277	28
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	12.3	12.3		12.3	12.3			33.2			33.2	33.2
Effective Green, g (s)	12.3	12.3		12.3	12.3			33.2			33.2	33.2
Actuated g/C Ratio	0.22	0.22		0.22	0.22			0.60			0.60	0.60
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	160	791		233	768			1721			756	921
v/s Ratio Prot		0.09			c0.13							
v/s Ratio Perm	0.02			0.03				0.02			c0.22	0.02
v/c Ratio	0.07	0.39		0.12	0.56			0.04			0.37	0.03
Uniform Delay, d1	16.9	18.1		17.0	19.0			4.4			5.5	4.4
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.2	0.3		0.2	1.0			0.0			1.4	0.1
Delay (s)	17.1	18.5		17.3	19.9			4.5			6.9	4.5
Level of Service	B	B		B	B			A			A	A
Approach Delay (s)		18.4			19.8			4.5			6.6	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		

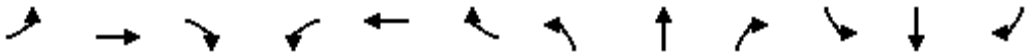
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	16	17	41	10	156	3	226	82	130	305	17
Future Volume (vph)	25	16	17	41	10	156	3	226	82	130	305	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected		0.98			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1737			1786	1550	1770	3371		1770	3506	
Flt Permitted		0.90			0.80	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1596			1495	1550	1770	3371		1770	3506	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	17	18	45	11	170	3	246	89	141	332	18
RTOR Reduction (vph)	0	11	0	0	0	103	0	76	0	0	6	0
Lane Group Flow (vph)	0	51	0	0	56	67	3	259	0	141	344	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		27.6			27.6	27.6	0.8	10.3		18.4	27.9	
Effective Green, g (s)		27.6			27.6	27.6	0.8	10.3		18.4	27.9	
Actuated g/C Ratio		0.39			0.39	0.39	0.01	0.15		0.26	0.40	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		629			589	611	20	496		465	1397	
v/s Ratio Prot							0.00	c0.08		c0.08	0.10	
v/s Ratio Perm		0.03			0.04	c0.04						
v/c Ratio		0.08			0.10	0.11	0.15	0.52		0.30	0.25	
Uniform Delay, d1		13.3			13.3	13.4	34.3	27.6		20.7	14.0	
Progression Factor		1.00			1.00	1.00	0.99	1.03		1.00	1.00	
Incremental Delay, d2		0.3			0.3	0.4	3.5	1.0		0.4	0.1	
Delay (s)		13.5			13.7	13.8	37.4	29.5		21.0	14.1	
Level of Service		B			B	B	D	C		C	B	
Approach Delay (s)		13.5			13.8			29.5			16.1	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

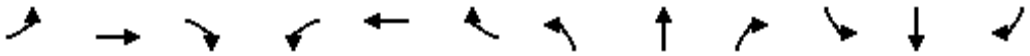
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	183	53	81	158	0	45	0	67	0	0	0
Future Volume (Veh/h)	0	183	53	81	158	0	45	0	67	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	199	58	88	172	0	49	0	73	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	172			257			576	576	228	649	605	172
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	172			257			576	576	228	649	605	172
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			93			88	100	91	100	100	100
cM capacity (veh/h)	1405			1308			406	399	811	330	384	872

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	257	260	122	0
Volume Left	0	88	49	0
Volume Right	58	0	73	0
cSH	1405	1308	579	1700
Volume to Capacity	0.00	0.07	0.21	0.00
Queue Length 95th (ft)	0	5	20	0
Control Delay (s)	0.0	3.1	12.9	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	3.1	12.9	0.0
Approach LOS			B	A

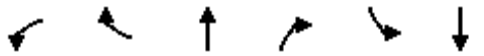
Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	42.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	75	16	4	54	3	28	0	11	3	0	3
Future Volume (Veh/h)	3	75	16	4	54	3	28	0	11	3	0	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	82	17	4	59	3	30	0	12	3	0	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	62			99			168	166	90	177	174	60
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	62			99			168	166	90	177	174	60
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			96	100	99	100	100	100
cM capacity (veh/h)	1541			1494			791	723	967	773	716	1005

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	102	66	42	6
Volume Left	3	4	30	3
Volume Right	17	3	12	3
cSH	1541	1494	834	874
Volume to Capacity	0.00	0.00	0.05	0.01
Queue Length 95th (ft)	0	0	4	1
Control Delay (s)	0.2	0.5	9.5	9.1
Lane LOS	A	A	A	A
Approach Delay (s)	0.2	0.5	9.5	9.1
Approach LOS			A	A

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	15.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	33	107	13	33	133	13
Future Volume (vph)	33	107	13	33	133	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	116	14	36	145	14

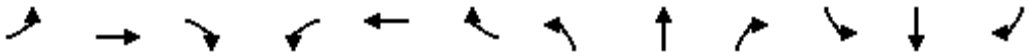
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	152	50	159
Volume Left (vph)	36	0	145
Volume Right (vph)	116	36	0
Hadj (s)	-0.38	-0.40	0.22
Departure Headway (s)	4.0	4.0	4.5
Degree Utilization, x	0.17	0.06	0.20
Capacity (veh/h)	857	850	765
Control Delay (s)	7.8	7.2	8.6
Approach Delay (s)	7.8	7.2	8.6
Approach LOS	A	A	A

Intersection Summary			
Delay	8.1		
Level of Service	A		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	206	129	25	137	5	98	13	25	22	16	7
Future Volume (Veh/h)	5	206	129	25	137	5	98	13	25	22	16	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	224	140	27	149	5	107	14	27	24	17	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	154			364			526	512	294	544	580	152
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	154			364			526	512	294	544	580	152
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			75	97	96	94	96	99
cM capacity (veh/h)	1426			1195			435	453	745	415	415	895

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	369	181	148	49
Volume Left	5	27	107	24
Volume Right	140	5	27	8
cSH	1426	1195	473	455
Volume to Capacity	0.00	0.02	0.31	0.11
Queue Length 95th (ft)	0	2	33	9
Control Delay (s)	0.1	1.4	16.0	13.9
Lane LOS	A	A	C	B
Approach Delay (s)	0.1	1.4	16.0	13.9
Approach LOS			C	B

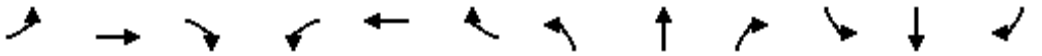
Intersection Summary			
Average Delay	4.5		
Intersection Capacity Utilization	41.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	130	8	6	81	11	2	3	16	4	4	3
Future Volume (Veh/h)	0	130	8	6	81	11	2	3	16	4	4	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	141	9	7	88	12	2	3	17	4	4	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	100			150			258	260	146	272	258	94
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	100			150			258	260	146	272	258	94
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	99	99	100
cM capacity (veh/h)	1493			1431			686	642	902	663	643	963

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	150	107	22	11
Volume Left	0	7	2	4
Volume Right	9	12	17	3
cSH	1493	1431	832	716
Volume to Capacity	0.00	0.00	0.03	0.02
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	0.5	9.4	10.1
Lane LOS		A	A	B
Approach Delay (s)	0.0	0.5	9.4	10.1
Approach LOS			A	B

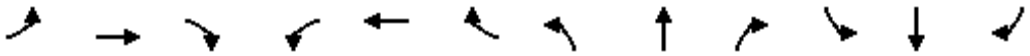
Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	19.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	51	41	42	24	8	52	159	15	19	175	10
Future Volume (vph)	49	51	41	42	24	8	52	159	15	19	175	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.96			0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.98			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1758			1784		1770	3494		1770	3510	
Flt Permitted		0.88			0.71		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1573			1299		1770	3494		1770	3510	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	55	45	46	26	9	57	173	16	21	190	11
RTOR Reduction (vph)	0	24	0	0	8	0	0	6	0	0	4	0
Lane Group Flow (vph)	0	129	0	0	73	0	57	183	0	21	197	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		10.9			10.5		8.8	42.5		2.0	36.5	
Effective Green, g (s)		10.9			10.5		8.8	42.5		2.0	36.5	
Actuated g/C Ratio		0.16			0.15		0.13	0.61		0.03	0.52	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		244			194		222	2121		50	1830	
v/s Ratio Prot							c0.03	0.05		c0.01	c0.06	
v/s Ratio Perm		c0.08			0.06							
v/c Ratio		0.53			0.38		0.26	0.09		0.42	0.11	
Uniform Delay, d1		27.2			26.8		27.6	5.7		33.4	8.5	
Progression Factor		1.00			1.00		1.00	1.00		1.32	1.43	
Incremental Delay, d2		2.0			1.5		0.2	0.1		5.6	0.1	
Delay (s)		29.2			28.3		27.9	5.8		49.8	12.3	
Level of Service		C			C		C	A		D	B	
Approach Delay (s)		29.2			28.3			10.9			15.8	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	37.3%	ICU Level of Service	A
Analysis Period (min)	15		

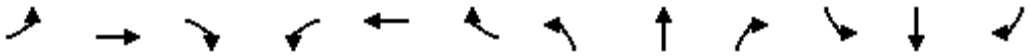
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	35	398	28	37	225	32	11	39	31	25	33	40
Future Volume (Veh/h)	35	398	28	37	225	32	11	39	31	25	33	40
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	38	433	30	40	245	35	12	42	34	27	36	43
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	280			463			928	884	448	922	882	262
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	280			463			928	884	448	922	882	262
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			96			94	84	94	86	87	94
cM capacity (veh/h)	1283			1098			200	266	611	198	267	776

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	501	320	88	106
Volume Left	38	40	12	27
Volume Right	30	35	34	43
cSH	1283	1098	322	324
Volume to Capacity	0.03	0.04	0.27	0.33
Queue Length 95th (ft)	2	3	27	35
Control Delay (s)	0.9	1.4	20.4	21.4
Lane LOS	A	A	C	C
Approach Delay (s)	0.9	1.4	20.4	21.4
Approach LOS			C	C

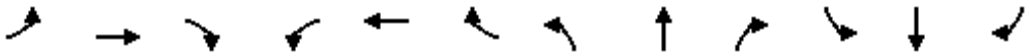
Intersection Summary				
Average Delay	4.9			
Intersection Capacity Utilization	45.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	75	17	10	46	1	13	17	23	5	9	3
Future Volume (vph)	2	75	17	10	46	1	13	17	23	5	9	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	82	18	11	50	1	14	18	25	5	10	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	102	62	57	18
Volume Left (vph)	2	11	14	5
Volume Right (vph)	18	1	25	3
Hadj (s)	-0.07	0.06	-0.18	-0.01
Departure Headway (s)	4.1	4.2	4.1	4.3
Degree Utilization, x	0.11	0.07	0.06	0.02
Capacity (veh/h)	865	830	837	798
Control Delay (s)	7.6	7.6	7.4	7.4
Approach Delay (s)	7.6	7.6	7.4	7.4
Approach LOS	A	A	A	A

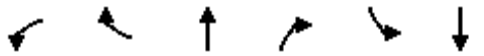
Intersection Summary				
Delay	7.5			
Level of Service	A			
Intersection Capacity Utilization	18.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	106	4	28	48	16	4	51	116	127	9	6
Future Volume (vph)	6	106	4	28	48	16	4	51	116	127	9	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	115	4	30	52	17	4	55	126	138	10	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	126	99	185	155
Volume Left (vph)	7	30	4	138
Volume Right (vph)	4	17	126	7
Hadj (s)	0.03	-0.01	-0.37	0.18
Departure Headway (s)	4.9	4.9	4.3	4.9
Degree Utilization, x	0.17	0.13	0.22	0.21
Capacity (veh/h)	682	679	788	694
Control Delay (s)	8.9	8.6	8.5	9.2
Approach Delay (s)	8.9	8.6	8.5	9.2
Approach LOS	A	A	A	A

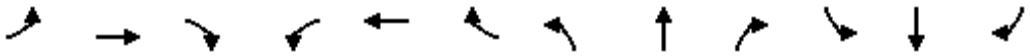
Intersection Summary				
Delay	8.8			
Level of Service	A			
Intersection Capacity Utilization	39.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	78	41	17	92	83
Future Volume (vph)	0	78	41	17	92	83
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	85	45	18	100	90

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	85	63	190
Volume Left (vph)	0	0	100
Volume Right (vph)	85	18	0
Hadj (s)	-0.57	-0.14	0.14
Departure Headway (s)	3.9	4.1	4.3
Degree Utilization, x	0.09	0.07	0.23
Capacity (veh/h)	868	837	822
Control Delay (s)	7.3	7.5	8.5
Approach Delay (s)	7.3	7.5	8.5
Approach LOS	A	A	A

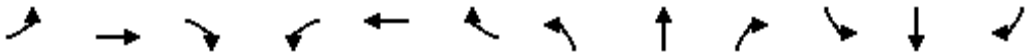
Intersection Summary			
Delay	8.0		
Level of Service	A		
Intersection Capacity Utilization	19.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	166	51	285	68	246	37	142	136	208	200	8
Future Volume (vph)	20	166	51	285	68	246	37	142	136	208	200	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97		1.00	0.99	1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.93		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1540		1790	1562	1770	3218		1770	3511	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1540		1790	1562	1770	3218		1770	3511	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	180	55	310	74	267	40	154	148	226	217	9
RTOR Reduction (vph)	0	0	48	0	0	147	0	117	0	0	3	0
Lane Group Flow (vph)	22	180	7	0	384	120	40	185	0	226	223	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	11.6	11.6	11.6		24.8	40.5	7.2	18.8		15.7	27.3	
Effective Green, g (s)	11.6	11.6	11.6		24.8	40.5	7.2	18.8		15.7	27.3	
Actuated g/C Ratio	0.13	0.13	0.13		0.28	0.45	0.08	0.21		0.17	0.30	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	228	240	198		493	702	141	672		308	1065	
v/s Ratio Prot	0.01	c0.10			c0.21	0.03	0.02	c0.06		c0.13	0.06	
v/s Ratio Perm			0.00			0.05						
v/c Ratio	0.10	0.75	0.04		0.78	0.17	0.28	0.28		0.73	0.21	
Uniform Delay, d1	34.6	37.8	34.3		30.1	14.7	39.0	29.9		35.2	23.3	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	11.1	0.0		7.6	0.0	0.4	1.0		7.6	0.4	
Delay (s)	34.6	48.9	34.3		37.7	14.8	39.4	30.9		42.7	23.8	
Level of Service	C	D	C		D	B	D	C		D	C	
Approach Delay (s)		44.5			28.3			31.9			33.3	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	19.1
Intersection Capacity Utilization	72.2%	ICU Level of Service	C
Analysis Period (min)	15		

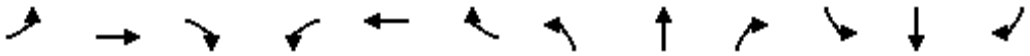
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	601	3	8	896	105	0	0	14	58	0	63
Future Volume (Veh/h)	17	601	3	8	896	105	0	0	14	58	0	63
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	653	3	9	974	114	0	0	15	63	0	68
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	1088			656			1808	1796	654	1754	1741	1031
vC1, stage 1 conf vol							690	690		1049	1049	
vC2, stage 2 conf vol							1117	1106		706	692	
vCu, unblocked vol	1088			571			1838	1826	570	1780	1765	1031
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			100	100	97	72	100	76
cM capacity (veh/h)	641			910			157	228	474	223	248	283

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	674	1097	15	131
Volume Left	18	9	0	63
Volume Right	3	114	15	68
cSH	641	910	474	251
Volume to Capacity	0.03	0.01	0.03	0.52
Queue Length 95th (ft)	2	1	2	69
Control Delay (s)	0.8	0.3	12.8	34.0
Lane LOS	A	A	B	D
Approach Delay (s)	0.8	0.3	12.8	34.0
Approach LOS			B	D

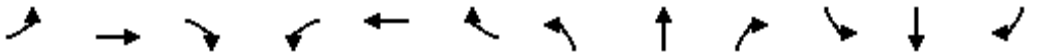
Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	77.5%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	695	4	11	1095	12	4	2	24	14	2	7
Future Volume (Veh/h)	5	695	4	11	1095	12	4	2	24	14	2	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	755	4	12	1190	13	4	2	26	15	2	8
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.93			0.93	0.93	0.93	0.93	0.93	
vC, conflicting volume	1203			760			1992	1995	758	2012	1990	1198
vC1, stage 1 conf vol							768	768		1220	1220	
vC2, stage 2 conf vol							1224	1227		792	770	
vCu, unblocked vol	1203			702			2031	2034	700	2053	2029	1198
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	99	94	92	99	96
cM capacity (veh/h)	580			829			176	206	407	179	209	226

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	5	759	12	1203	32	25
Volume Left	5	0	12	0	4	15
Volume Right	0	4	0	13	26	8
cSH	580	1700	829	1700	332	194
Volume to Capacity	0.01	0.45	0.01	0.71	0.10	0.13
Queue Length 95th (ft)	1	0	1	0	8	11
Control Delay (s)	11.3	0.0	9.4	0.0	17.0	26.2
Lane LOS	B		A		C	D
Approach Delay (s)	0.1		0.1		17.0	26.2
Approach LOS					C	D

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	69.3%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	34	758	2	13	978	162	0	0	11	0	0	27
Future Volume (Veh/h)	34	758	2	13	978	162	0	0	11	0	0	27
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	37	824	2	14	1063	176	0	0	12	0	0	29
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1239			826			2019	2166	825	2089	2079	1151
vC1, stage 1 conf vol							899	899		1179	1179	
vC2, stage 2 conf vol							1120	1267		910	900	
vCu, unblocked vol	1239			826			2019	2166	825	2089	2079	1151
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			98			100	100	97	100	100	88
cM capacity (veh/h)	562			805			154	170	372	175	201	241

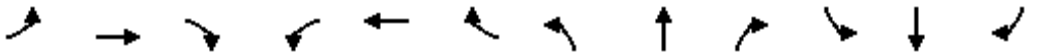
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	37	826	14	1239	12	29
Volume Left	37	0	14	0	0	0
Volume Right	0	2	0	176	12	29
cSH	562	1700	805	1700	372	241
Volume to Capacity	0.07	0.49	0.02	0.73	0.03	0.12
Queue Length 95th (ft)	5	0	1	0	2	10
Control Delay (s)	11.9	0.0	9.6	0.0	15.0	22.0
Lane LOS	B		A		B	C
Approach Delay (s)	0.5		0.1		15.0	22.0
Approach LOS					B	C

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	78.0%	ICU Level of Service	D	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	94	0	0	10	40	238	4	7	538	14
Future Volume (Veh/h)	0	0	94	0	0	10	40	238	4	7	538	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	102	0	0	11	43	259	4	8	585	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked	0.93	0.93	0.93	0.93	0.93		0.93					
vC, conflicting volume	835	958	592	1050	963	132	600			263		
vC1, stage 1 conf vol	608	608		347	347							
vC2, stage 2 conf vol	226	349		703	616							
vCu, unblocked vol	783	915	521	1015	921	132	529			263		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	78	100	100	99	96			99		
cM capacity (veh/h)	420	418	464	252	392	894	959			1298		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	102	11	43	173	90	8	600
Volume Left	0	0	43	0	0	8	0
Volume Right	102	11	0	0	4	0	15
cSH	464	894	959	1700	1700	1298	1700
Volume to Capacity	0.22	0.01	0.04	0.10	0.05	0.01	0.35
Queue Length 95th (ft)	21	1	4	0	0	0	0
Control Delay (s)	14.9	9.1	8.9	0.0	0.0	7.8	0.0
Lane LOS	B	A	A			A	
Approach Delay (s)	14.9	9.1	1.3			0.1	
Approach LOS	B	A					

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	41.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	3	11	15	4	2	7	149	2	2	146	8
Future Volume (vph)	24	3	11	15	4	2	7	149	2	2	146	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5		4.5			4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95			0.95	
Frt		1.00	0.85		1.00	0.85		1.00			0.99	
Flt Protected		0.96	1.00		0.96	1.00		1.00			1.00	
Satd. Flow (prot)		1783	1583		1791	1583		3525			3509	
Flt Permitted		1.00	1.00		1.00	1.00		0.95			0.95	
Satd. Flow (perm)		1863	1583		1863	1583		3344			3348	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	3	12	16	4	2	8	162	2	2	159	9
RTOR Reduction (vph)	0	0	11	0	0	2	0	1	0	0	2	0
Lane Group Flow (vph)	0	29	1	0	20	0	0	171	0	0	168	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		3.0	3.0		3.0	3.0		33.0			33.0	
Effective Green, g (s)		3.0	3.0		3.0	3.0		33.0			33.0	
Actuated g/C Ratio		0.07	0.07		0.07	0.07		0.73			0.73	
Clearance Time (s)		4.5	4.5		4.5	4.5		4.5			4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		124	105		124	105		2452			2455	
v/s Ratio Prot												
v/s Ratio Perm		c0.02	0.00		0.01	0.00		c0.05			0.05	
v/c Ratio		0.23	0.01		0.16	0.00		0.07			0.07	
Uniform Delay, d1		19.9	19.6		19.8	19.6		1.7			1.7	
Progression Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Incremental Delay, d2		1.0	0.0		0.6	0.0		0.1			0.1	
Delay (s)		20.9	19.6		20.4	19.6		1.7			1.7	
Level of Service		C	B		C	B		A			A	
Approach Delay (s)		20.5			20.4			1.7			1.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	4.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.08		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	25.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	2	5	6	2	9	5	91	6	9	91	7
Future Volume (Veh/h)	7	2	5	6	2	9	5	91	6	9	91	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	2	5	7	2	10	5	99	7	10	99	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								836			1100	
pX, platoon unblocked												
vC, conflicting volume	194	239	54	188	240	53	107			106		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	194	239	54	188	240	53	107			106		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	99	100	99	100			99		
cM capacity (veh/h)	734	654	1002	744	654	1003	1482			1483		

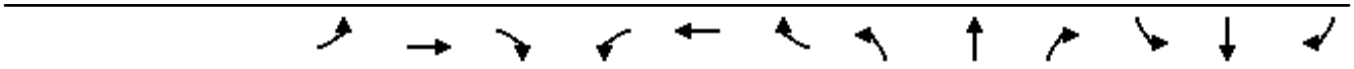
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	15	19	54	56	60	58
Volume Left	8	7	5	0	10	0
Volume Right	5	10	0	7	0	8
cSH	792	847	1482	1700	1483	1700
Volume to Capacity	0.02	0.02	0.00	0.03	0.01	0.03
Queue Length 95th (ft)	1	2	0	0	1	0
Control Delay (s)	9.6	9.3	0.7	0.0	1.3	0.0
Lane LOS	A	A	A		A	
Approach Delay (s)	9.6	9.3	0.3		0.7	
Approach LOS	A	A				

Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	17.2%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	19	22	11	15	25	11	76	11	21	65	22
Future Volume (Veh/h)	8	19	22	11	15	25	11	76	11	21	65	22
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	21	24	12	16	27	12	83	12	23	71	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								538			726	
pX, platoon unblocked												
vC, conflicting volume	230	248	48	229	254	48	95			95		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	230	248	48	229	254	48	95			95		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	97	98	98	97	97	99			98		
cM capacity (veh/h)	662	638	1011	661	633	1011	1497			1497		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	54	55	54	54	58	60
Volume Left	9	12	12	0	23	0
Volume Right	24	27	0	12	0	24
cSH	769	784	1497	1700	1497	1700
Volume to Capacity	0.07	0.07	0.01	0.03	0.02	0.04
Queue Length 95th (ft)	6	6	1	0	1	0
Control Delay (s)	10.0	9.9	1.7	0.0	3.0	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	10.0	9.9	0.9		1.5	
Approach LOS	B	A				

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	18.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	150	7	33	7	66	8	22	737	18
Future Volume (veh/h)	0	0	0	150	7	33	7	66	8	22	737	18
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h				169	0	0	8	72	0	24	801	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				1135	0	507	142	1831	570	142	1274	570
Arrive On Green				0.32	0.00	0.00	0.08	0.36	0.00	0.08	0.36	0.00
Sat Flow, veh/h				3548	0	1583	1774	5085	1583	1774	3539	1583
Grp Volume(v), veh/h				169	0	0	8	72	0	24	801	0
Grp Sat Flow(s),veh/h/ln				1774	0	1583	1774	1695	1583	1774	1770	1583
Q Serve(g_s), s				1.7	0.0	0.0	0.2	0.5	0.0	0.6	9.4	0.0
Cycle Q Clear(g_c), s				1.7	0.0	0.0	0.2	0.5	0.0	0.6	9.4	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				1135	0	507	142	1831	570	142	1274	570
V/C Ratio(X)				0.15	0.00	0.00	0.06	0.04	0.00	0.17	0.63	0.00
Avail Cap(c_a), veh/h				1135	0	507	142	1831	570	142	1274	570
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				12.1	0.0	0.0	21.3	10.4	0.0	21.5	13.2	0.0
Incr Delay (d2), s/veh				0.3	0.0	0.0	0.8	0.0	0.0	2.6	2.4	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.9	0.0	0.0	0.1	0.2	0.0	0.4	5.0	0.0
LnGrp Delay(d),s/veh				12.4	0.0	0.0	22.0	10.4	0.0	24.0	15.6	0.0
LnGrp LOS				B			C	B		C	B	
Approach Vol, veh/h					169			80			825	
Approach Delay, s/veh					12.4			11.6			15.8	
Approach LOS					B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	22.0			8.0	22.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	18.0			4.0	18.0		16.0
Max Q Clear Time (g_c+I1), s	2.6	2.5			2.2	11.4		3.7
Green Ext Time (p_c), s	0.0	0.3			0.0	2.9		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	15.0
HCM 2010 LOS	B

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	451	157	423	921	0	0
Future Volume (veh/h)	451	157	423	921	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863		
Adj Flow Rate, veh/h	490	171	460	1001		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1681	752	1119	3185		
Arrive On Green	0.47	0.47	0.32	0.90		
Sat Flow, veh/h	3632	1583	3442	3632		
Grp Volume(v), veh/h	490	171	460	1001		
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770		
Q Serve(g_s), s	3.4	2.5	4.2	1.6		
Cycle Q Clear(g_c), s	3.4	2.5	4.2	1.6		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1681	752	1119	3185		
V/C Ratio(X)	0.29	0.23	0.41	0.31		
Avail Cap(c_a), veh/h	1681	752	1119	3185		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	6.4	6.2	10.5	0.3		
Incr Delay (d2), s/veh	0.4	0.7	1.1	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.7	1.2	2.2	0.8		
LnGrp Delay(d),s/veh	6.8	6.9	11.6	0.5		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	661			1461		
Approach Delay, s/veh	6.8			4.0		
Approach LOS	A			A		

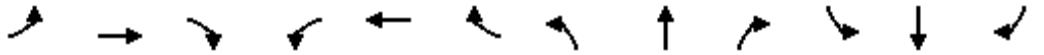
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			17.0	23.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			13.0	19.0				36.0
Max Q Clear Time (g_c+I1), s			6.2	5.4				3.6
Green Ext Time (p_c), s			1.0	3.3				8.7

Intersection Summary	
HCM 2010 Ctrl Delay	4.9
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	611	60	727	1882	60	1
Future Volume (veh/h)	611	60	727	1882	60	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	664	65	790	2046	65	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	944	422	918	2124	473	422
Arrive On Green	0.27	0.27	0.27	0.60	0.27	0.00
Sat Flow, veh/h	3632	1583	3442	3632	1774	1583
Grp Volume(v), veh/h	664	65	790	2046	65	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770	1774	1583
Q Serve(g_s), s	10.2	1.9	13.1	32.9	1.7	0.0
Cycle Q Clear(g_c), s	10.2	1.9	13.1	32.9	1.7	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	944	422	918	2124	473	422
V/C Ratio(X)	0.70	0.15	0.86	0.96	0.14	0.00
Avail Cap(c_a), veh/h	944	422	918	2124	473	422
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.9	16.8	20.9	11.4	16.7	0.0
Incr Delay (d2), s/veh	4.4	0.8	10.4	12.6	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.9	7.5	19.4	0.9	0.0
LnGrp Delay(d),s/veh	24.2	17.6	31.3	24.0	17.4	0.0
LnGrp LOS	C	B	C	C	B	
Approach Vol, veh/h	729			2836	65	
Approach Delay, s/veh	23.6			26.1	17.4	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		3.7	15.1	12.2				34.9
Green Ext Time (p_c), s		0.1	0.4	1.7				1.0

Intersection Summary	
HCM 2010 Ctrl Delay	25.4
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	310	4	99	538	190	10	0	119	24	34	35
Future Volume (veh/h)	0	310	4	99	538	190	10	0	119	24	34	35
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	1863	1863	0	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	337	4	108	585	0	11	0	129	26	37	38
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1102	13	273	1906	853	0	0	0	546	573	487
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3676	42	1774	3539	1583		0		1774	1863	1583
Grp Volume(v), veh/h	0	166	175	108	585	0		0.0		26	37	38
Grp Sat Flow(s),veh/h/ln	0	1770	1855	1774	1770	1583				1774	1863	1583
Q Serve(g_s), s	0.0	3.7	3.7	2.9	4.8	0.0				0.5	0.7	0.9
Cycle Q Clear(g_c), s	0.0	3.7	3.7	2.9	4.8	0.0				0.5	0.7	0.9
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	544	571	273	1906	853				546	573	487
V/C Ratio(X)	0.00	0.31	0.31	0.40	0.31	0.00				0.05	0.06	0.08
Avail Cap(c_a), veh/h	0	544	571	273	1906	853				546	573	487
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.8	13.8	19.8	6.6	0.0				12.6	12.7	12.8
Incr Delay (d2), s/veh	0.0	1.4	1.4	4.3	0.4	0.0				0.2	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.0	2.1	1.7	2.4	0.0				0.3	0.4	0.4
LnGrp Delay(d),s/veh	0.0	15.2	15.1	24.1	7.1	0.0				12.8	12.9	13.1
LnGrp LOS		B	B	C	A					B	B	B
Approach Vol, veh/h		341			693						101	
Approach Delay, s/veh		15.2			9.7						13.0	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			4.9	5.7		2.9		6.8
Green Ext Time (p_c), s			0.1	1.4		0.2		4.0

Intersection Summary	
HCM 2010 Ctrl Delay	11.6
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	218	435	5	9	573	344	10	10	19	134	2	54
Future Volume (veh/h)	218	435	5	9	573	344	10	10	19	134	2	54
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	237	473	5	10	623	374	11	11	21	104	61	59
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	260	1100	12	95	755	338	194	194	338	378	186	180
Arrive On Green	0.15	0.31	0.31	0.05	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1774	3588	38	1774	3539	1583	909	909	1583	1774	871	843
Grp Volume(v), veh/h	237	233	245	10	623	374	22	0	21	104	0	120
Grp Sat Flow(s),veh/h/ln	1774	1770	1856	1774	1770	1583	1817	0	1583	1774	0	1714
Q Serve(g_s), s	9.9	7.9	7.9	0.4	12.6	16.0	0.7	0.0	0.8	3.7	0.0	4.4
Cycle Q Clear(g_c), s	9.9	7.9	7.9	0.4	12.6	16.0	0.7	0.0	0.8	3.7	0.0	4.4
Prop In Lane	1.00		0.02	1.00		1.00	0.50		1.00	1.00		0.49
Lane Grp Cap(c), veh/h	260	543	569	95	755	338	388	0	338	378	0	366
V/C Ratio(X)	0.91	0.43	0.43	0.11	0.83	1.11	0.06	0.00	0.06	0.27	0.00	0.33
Avail Cap(c_a), veh/h	260	543	569	95	755	338	388	0	338	378	0	366
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.5	20.8	20.8	33.8	28.2	29.5	23.5	0.0	23.5	24.7	0.0	25.0
Incr Delay (d2), s/veh	36.8	2.5	2.4	2.2	10.0	81.0	0.3	0.0	0.4	1.8	0.0	2.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.5	4.2	4.4	0.3	7.2	14.5	0.4	0.0	0.4	2.0	0.0	2.3
LnGrp Delay(d),s/veh	68.4	23.2	23.1	36.0	38.1	110.5	23.8	0.0	23.9	26.4	0.0	27.3
LnGrp LOS	E	C	C	D	D	F	C		C	C		C
Approach Vol, veh/h		715			1007			43			224	
Approach Delay, s/veh		38.2			65.0			23.8			26.9	
Approach LOS		D			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	27.0		20.0	15.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	23.0		16.0	11.0	16.0
Max Q Clear Time (g_c+I1), s		2.8	2.4	9.9		6.4	11.9	18.0
Green Ext Time (p_c), s		0.1	0.0	2.3		0.6	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	50.2
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	377	283	82	746	182	251	128	78	223	268	190
Future Volume (veh/h)	73	377	283	82	746	182	251	128	78	223	268	190
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	79	410	308	89	811	198	206	233	85	242	291	207
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	101	470	350	127	910	407	405	426	362	405	426	362
Arrive On Green	0.06	0.24	0.24	0.07	0.26	0.26	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1774	1936	1442	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	79	374	344	89	811	198	206	233	85	242	291	207
Grp Sat Flow(s),veh/h/ln	1774	1770	1608	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.1	14.2	14.4	3.4	15.5	7.4	7.1	7.7	3.1	8.5	10.0	8.1
Cycle Q Clear(g_c), s	3.1	14.2	14.4	3.4	15.5	7.4	7.1	7.7	3.1	8.5	10.0	8.1
Prop In Lane	1.00		0.90	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	101	430	391	127	910	407	405	426	362	405	426	362
V/C Ratio(X)	0.78	0.87	0.88	0.70	0.89	0.49	0.51	0.55	0.23	0.60	0.68	0.57
Avail Cap(c_a), veh/h	101	430	391	127	910	407	405	426	362	405	426	362
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.6	25.4	25.5	31.8	25.1	22.1	23.6	23.8	22.0	24.1	24.7	24.0
Incr Delay (d2), s/veh	43.6	20.9	23.5	27.8	12.8	4.1	4.5	5.0	1.5	6.3	8.6	6.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	9.4	8.9	2.7	9.2	3.7	3.9	4.5	1.5	4.9	6.1	4.2
LnGrp Delay(d),s/veh	76.1	46.3	49.0	59.5	37.9	26.2	28.1	28.8	23.5	30.5	33.3	30.4
LnGrp LOS	E	D	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		797			1098			524			740	
Approach Delay, s/veh		50.4			37.5			27.7			31.6	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	8.0	22.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		9.7	5.4	16.4		12.0	5.1	17.5
Green Ext Time (p_c), s		1.3	0.0	0.3		1.3	0.0	0.3

Intersection Summary	
HCM 2010 Ctrl Delay	37.7
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	86	7	15	65	39	2	3	5	0	0	0
Future Vol, veh/h	25	86	7	15	65	39	2	3	5	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	93	8	16	71	42	2	3	5	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.8	7.5	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	20%	21%	13%
Vol Thru, %	30%	73%	55%
Vol Right, %	50%	6%	33%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	10	118	119
LT Vol	2	25	15
Through Vol	3	86	65
RT Vol	5	7	39
Lane Flow Rate	11	128	129
Geometry Grp	1	1	1
Degree of Util (X)	0.013	0.145	0.139
Departure Headway (Hd)	4.214	4.057	3.878
Convergence, Y/N	Yes	Yes	Yes
Cap	854	884	922
Service Time	2.214	2.083	1.909
HCM Lane V/C Ratio	0.013	0.145	0.14
HCM Control Delay	7.3	7.8	7.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.5	0.5

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	147	67	50	59	0	0	0	0	17	0	55
Future Vol, veh/h	0	147	67	50	59	0	0	0	0	17	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	160	73	54	64	0	0	0	0	18	0	60

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	160	0	0			332	332	64
Stage 1	-	-	-	-	-	-			172	172	-
Stage 2	-	-	-	-	-	-			160	160	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1419	-	0			663	588	1000
Stage 1	0	-	-	-	-	0			858	756	-
Stage 2	0	-	-	-	-	0			869	766	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1419	-	-			637	0	1000
Mov Cap-2 Maneuver	-	-	-	-	-	-			637	0	-
Stage 1	-	-	-	-	-	-			825	0	-
Stage 2	-	-	-	-	-	-			869	0	-

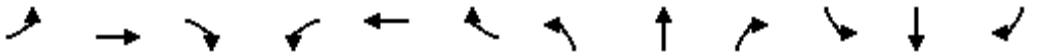
Approach	EB	WB	SB
HCM Control Delay, s	0	3.5	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1419	-	637	1000
HCM Lane V/C Ratio	-	-	0.038	-	0.029	0.06
HCM Control Delay (s)	-	-	7.6	0	10.8	8.8
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	476	186	1010	1130	16	960
Future Volume (veh/h)	476	186	1010	1130	16	960
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	517	0	1098	1228	17	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	841	376	1420	1304	355	557
Arrive On Green	0.24	0.00	0.41	0.70	0.20	0.00
Sat Flow, veh/h	3632	1583	3442	1863	1774	2787
Grp Volume(v), veh/h	517	0	1098	1228	17	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1863	1774	1393
Q Serve(g_s), s	10.4	0.0	22.0	46.4	0.6	0.0
Cycle Q Clear(g_c), s	10.4	0.0	22.0	46.4	0.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	841	376	1420	1304	355	557
V/C Ratio(X)	0.62	0.00	0.77	0.94	0.05	0.00
Avail Cap(c_a), veh/h	841	376	1420	1304	355	557
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	27.2	0.0	20.3	10.6	25.8	0.0
Incr Delay (d2), s/veh	3.4	0.0	4.2	14.4	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	0.0	11.2	28.4	0.3	0.0
LnGrp Delay(d),s/veh	30.6	0.0	24.4	25.0	26.1	0.0
LnGrp LOS	C		C	C	C	
Approach Vol, veh/h	517			2326	17	
Approach Delay, s/veh	30.6			24.7	26.1	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	37.0	23.0				60.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	33.0	19.0				56.0
Max Q Clear Time (g_c+I1), s		2.6	24.0	12.4				48.4
Green Ext Time (p_c), s		0.0	3.2	1.8				5.5

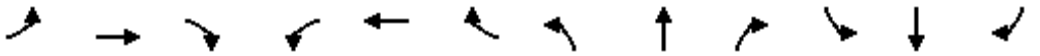
Intersection Summary	
HCM 2010 Ctrl Delay	25.8
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	277	115	193	501	328	1848	213	38	188	133	75	79
Future Volume (vph)	277	115	193	501	328	1848	213	38	188	133	75	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3015	1441		1787	1583		1805	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3015	1441		1787	1583		1805	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	301	125	210	545	357	2009	232	41	204	145	82	86
RTOR Reduction (vph)	0	0	166	0	403	403	0	0	120	0	0	75
Lane Group Flow (vph)	301	125	44	545	959	601	0	273	84	0	227	11
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	20.0	21.3	21.3	40.1	45.0	45.0		21.8	21.8		16.0	16.0
Effective Green, g (s)	20.0	21.3	21.3	40.1	45.0	45.0		21.8	21.8		16.0	16.0
Actuated g/C Ratio	0.17	0.18	0.18	0.33	0.38	0.38		0.18	0.18		0.13	0.13
Clearance Time (s)	4.0	5.6	5.6	4.0	2.0	2.0		5.6	5.6		5.6	5.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	295	330	280	591	1130	540		324	287		240	211
v/s Ratio Prot	c0.17	0.07		0.31	0.32			c0.15			c0.13	
v/s Ratio Perm			0.03			c0.42			0.05			0.01
v/c Ratio	1.02	0.38	0.16	0.92	1.04dr	1.11		0.84	0.29		0.95	0.05
Uniform Delay, d1	50.0	43.5	41.8	38.4	34.4	37.5		47.4	42.4		51.6	45.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	57.7	0.3	0.1	20.0	5.9	73.5		22.6	2.6		45.6	0.5
Delay (s)	107.7	43.8	41.8	58.5	40.2	111.0		70.0	45.0		97.2	45.9
Level of Service	F	D	D	E	D	F		E	D		F	D
Approach Delay (s)		73.4			68.0			59.3			83.1	
Approach LOS		E			E			E			F	

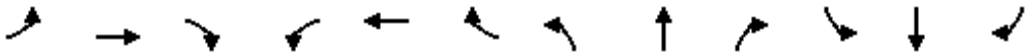
Intersection Summary			
HCM 2000 Control Delay	68.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	20.8
Intersection Capacity Utilization	116.8%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	6	582	0	257	6	318	593	442	408	2
Future Volume (vph)	0	0	6	582	0	257	6	318	593	442	408	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6		4.6	4.6	4.0		4.6	4.0		4.6	
Lane Util. Factor		1.00		0.95	0.95	1.00		0.95	1.00		0.95	
Frt		0.86		1.00	1.00	0.85		1.00	0.85		1.00	
Flt Protected		1.00		0.95	0.95	1.00		1.00	1.00		0.97	
Satd. Flow (prot)		1611		1681	1681	1583		3536	1583		3449	
Flt Permitted		1.00		0.95	0.95	1.00		1.00	1.00		0.97	
Satd. Flow (perm)		1611		1681	1681	1583		3536	1583		3449	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	7	633	0	279	7	346	645	480	443	2
RTOR Reduction (vph)	0	7	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	316	317	279	0	353	645	0	925	0
Turn Type		NA		Split	NA	Free	Split	NA	Free	Split	NA	
Protected Phases		4		8	8		2	2		6	6	
Permitted Phases	4					Free			Free			
Actuated Green, G (s)		1.0		18.4	18.4	83.1		18.7	83.1		26.6	
Effective Green, g (s)		1.0		18.4	18.4	83.1		18.7	83.1		26.6	
Actuated g/C Ratio		0.01		0.22	0.22	1.00		0.23	1.00		0.32	
Clearance Time (s)		4.6		4.6	4.6			4.6			4.6	
Vehicle Extension (s)		3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)		19		372	372	1583		795	1583		1104	
v/s Ratio Prot		0.00		0.19	c0.19			0.10			c0.27	
v/s Ratio Perm						0.18			c0.41			
v/c Ratio		0.00		0.85	0.85	0.18		0.44	0.41		0.84	
Uniform Delay, d1		40.6		31.0	31.0	0.0		27.7	0.0		26.2	
Progression Factor		1.00		1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2		0.1		16.4	16.9	0.2		1.8	0.8		7.6	
Delay (s)		40.7		47.4	47.9	0.2		29.5	0.8		33.9	
Level of Service		D		D	D	A		C	A		C	
Approach Delay (s)		40.7			33.2			10.9			33.9	
Approach LOS		D			C			B			C	

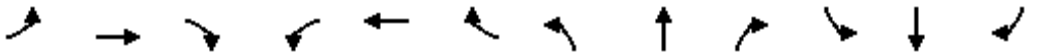
Intersection Summary			
HCM 2000 Control Delay	25.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	83.1	Sum of lost time (s)	18.4
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
Description: SR-76 & Coast Hwy			
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	58	38	97	100	146	60	107	102	168	146	35
Future Volume (vph)	1	58	38	97	100	146	60	107	102	168	146	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	63	41	105	109	159	65	116	111	183	159	38

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	105	373	292	380
Volume Left (vph)	1	105	65	183
Volume Right (vph)	41	159	111	38
Hadj (s)	-0.20	-0.17	-0.15	0.07
Departure Headway (s)	6.7	6.0	6.1	6.1
Degree Utilization, x	0.20	0.62	0.49	0.65
Capacity (veh/h)	431	559	542	550
Control Delay (s)	11.3	18.5	14.9	19.5
Approach Delay (s)	11.3	18.5	14.9	19.5
Approach LOS	B	C	B	C

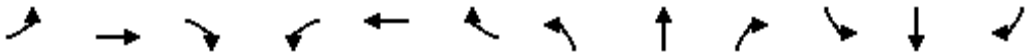
Intersection Summary				
Delay	17.3			
Level of Service	C			
Intersection Capacity Utilization	70.3%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	126	58	51	13	51	32	36	315	20	51	319	91
Future Volume (vph)	126	58	51	13	51	32	36	315	20	51	319	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frt		1.00	0.85		0.95		1.00	0.99		1.00	0.97	
Flt Protected		0.97	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1801	1583		1766		1770	3507		1770	3421	
Flt Permitted		0.76	1.00		0.96		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1414	1583		1712		1770	3507		1770	3421	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	137	63	55	14	55	35	39	342	22	55	347	99
RTOR Reduction (vph)	0	0	41	0	26	0	0	5	0	0	27	0
Lane Group Flow (vph)	0	200	14	0	78	0	39	359	0	55	419	0
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		18.8	18.8		18.8		13.7	35.3		10.1	36.5	
Effective Green, g (s)		18.8	18.8		18.8		13.7	35.3		10.1	36.5	
Actuated g/C Ratio		0.25	0.25		0.25		0.18	0.47		0.13	0.49	
Clearance Time (s)		2.0	2.0		2.0		2.0	4.2		4.6	2.0	
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		3.0	7.0	
Lane Grp Cap (vph)		354	396		429		323	1650		238	1664	
v/s Ratio Prot							0.02	c0.10		0.03	c0.12	
v/s Ratio Perm		c0.14	0.01		0.05							
v/c Ratio		0.56	0.03		0.18		0.12	0.22		0.23	0.25	
Uniform Delay, d1		24.5	21.2		22.1		25.6	11.7		29.0	11.3	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.1	0.1		0.7		0.2	0.3		0.5	0.3	
Delay (s)		29.6	21.4		22.8		25.8	12.0		29.5	11.5	
Level of Service		C	C		C		C	B		C	B	
Approach Delay (s)		27.8			22.8			13.3			13.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	10.8
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

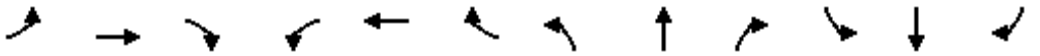
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	39	34	25	45	54	28	312	45	30	326	32
Future Volume (vph)	38	39	34	25	45	54	28	312	45	30	326	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frt	1.00	0.93		1.00	0.92			0.98			0.99	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1770	1732		1770	1710			3465			3482	
Flt Permitted	0.69	1.00		0.71	1.00			0.90			0.89	
Satd. Flow (perm)	1280	1732		1314	1710			3131			3127	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	41	42	37	27	49	59	30	339	49	33	354	35
RTOR Reduction (vph)	0	16	0	0	25	0	0	26	0	0	17	0
Lane Group Flow (vph)	41	63	0	27	83	0	0	392	0	0	405	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	28.4	28.4		28.4	28.4			12.8			12.8	
Effective Green, g (s)	28.4	28.4		28.4	28.4			12.8			12.8	
Actuated g/C Ratio	0.57	0.57		0.57	0.57			0.26			0.26	
Clearance Time (s)	4.2	4.2		4.2	4.2			4.6			4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	
Lane Grp Cap (vph)	727	983		746	971			801			800	
v/s Ratio Prot		0.04			c0.05							
v/s Ratio Perm	0.03			0.02				0.13			c0.13	
v/c Ratio	0.06	0.06		0.04	0.08			0.49			0.51	
Uniform Delay, d1	4.8	4.8		4.8	4.9			15.8			15.9	
Progression Factor	1.00	1.00		1.00	1.00			1.29			1.00	
Incremental Delay, d2	0.1	0.1		0.1	0.2			0.6			0.7	
Delay (s)	5.0	5.0		4.9	5.1			21.0			16.6	
Level of Service	A	A		A	A			C			B	
Approach Delay (s)		5.0			5.0			21.0			16.6	
Approach LOS		A			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

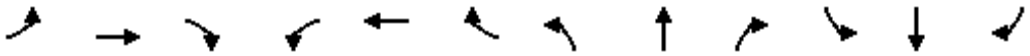
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	45	55	27	45	75	42	347	62	34	347	94
Future Volume (vph)	49	45	55	27	45	75	42	347	62	34	347	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95			0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			1.00			0.99	
Flpb, ped/bikes	0.99	1.00		0.99	1.00			1.00			1.00	
Frt	1.00	0.92		1.00	0.91			0.98			0.97	
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	
Satd. Flow (prot)	1749	1688		1756	1660			3436			3396	
Flt Permitted	0.67	1.00		0.69	1.00			0.85			0.89	
Satd. Flow (perm)	1239	1688		1269	1660			2932			3035	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	49	60	29	49	82	46	377	67	37	377	102
RTOR Reduction (vph)	0	26	0	0	37	0	0	31	0	0	54	0
Lane Group Flow (vph)	53	83	0	29	94	0	0	459	0	0	462	0
Confl. Peds. (#/hr)	16		11	11		16	10		17	17		10
Confl. Bikes (#/hr)			2			2						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	28.0	28.0		27.2	27.2			12.8			13.3	
Effective Green, g (s)	28.0	28.0		27.2	27.2			12.8			13.3	
Actuated g/C Ratio	0.56	0.56		0.54	0.54			0.26			0.27	
Clearance Time (s)	4.2	4.2		5.0	5.0			5.0			4.5	
Vehicle Extension (s)	3.0	3.0		3.5	3.5			3.0			3.5	
Lane Grp Cap (vph)	693	945		690	903			750			807	
v/s Ratio Prot		0.05			c0.06							
v/s Ratio Perm	0.04			0.02				c0.16			0.15	
v/c Ratio	0.08	0.09		0.04	0.10			0.61			0.57	
Uniform Delay, d1	5.1	5.1		5.3	5.5			16.4			15.9	
Progression Factor	1.00	1.00		1.00	1.00			0.54			0.52	
Incremental Delay, d2	0.2	0.2		0.1	0.2			1.5			1.0	
Delay (s)	5.3	5.3		5.4	5.7			10.3			9.3	
Level of Service	A	A		A	A			B			A	
Approach Delay (s)		5.3			5.7			10.3			9.3	
Approach LOS		A			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	18	151	158	18	29	52	419	74	29	377	15
Future Volume (vph)	18	18	151	158	18	29	52	419	74	29	377	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	20	164	172	20	32	57	455	80	32	410	16

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	40	164	224	285	308	237	221
Volume Left (vph)	20	0	172	57	0	32	0
Volume Right (vph)	0	164	32	0	80	0	16
Hadj (s)	0.28	-0.67	0.10	0.13	-0.15	0.10	-0.02
Departure Headway (s)	8.2	7.2	7.7	7.1	6.8	7.2	7.1
Degree Utilization, x	0.09	0.33	0.48	0.56	0.58	0.48	0.44
Capacity (veh/h)	404	457	444	488	507	479	487
Control Delay (s)	10.8	12.6	17.4	17.5	17.6	15.5	14.3
Approach Delay (s)	12.2		17.4	17.6		14.9	
Approach LOS	B		C	C		B	

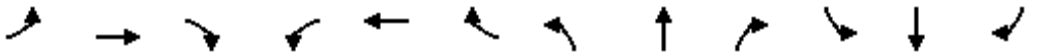
Intersection Summary				
Delay	16.0			
Level of Service	C			
Intersection Capacity Utilization	55.3%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	289	103	199	201	75	233
Future Volume (vph)	289	103	199	201	75	233
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	314	112	216	218	82	253

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	314	112	434	335
Volume Left (vph)	314	0	0	82
Volume Right (vph)	0	112	218	0
Hadj (s)	0.53	-0.67	-0.27	0.08
Departure Headway (s)	7.2	6.0	5.6	6.1
Degree Utilization, x	0.63	0.19	0.67	0.57
Capacity (veh/h)	472	575	618	567
Control Delay (s)	20.2	9.1	19.4	16.7
Approach Delay (s)	17.3		19.4	16.7
Approach LOS	C		C	C

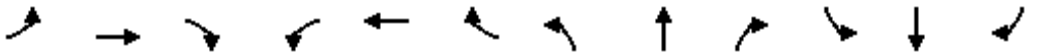
Intersection Summary			
Delay	17.9		
Level of Service	C		
Intersection Capacity Utilization	65.2%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	47	0	320	82	300	95	0	0	0	0	137	99
Future Volume (vph)	47	0	320	82	300	95	0	0	0	0	137	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0						4.0	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.96						0.94	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3412						3316	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3412						3316	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	51	0	348	89	326	103	0	0	0	0	149	108
RTOR Reduction (vph)	0	0	307	69	69	0	0	0	0	0	63	0
Lane Group Flow (vph)	51	0	41	20	360	0	0	0	0	0	194	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	5.9		5.9	11.3	11.3						20.8	
Effective Green, g (s)	5.9		5.9	11.3	11.3						20.8	
Actuated g/C Ratio	0.12		0.12	0.23	0.23						0.42	
Clearance Time (s)	4.0		4.0	4.0	4.0						4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	208		328	400	771						1379	
v/s Ratio Prot	c0.03		0.01	0.01	c0.11						c0.06	
v/s Ratio Perm												
v/c Ratio	0.25		0.13	0.05	0.47						0.14	
Uniform Delay, d1	20.0		19.7	15.1	16.7						9.1	
Progression Factor	1.00		1.00	1.66	1.11						1.00	
Incremental Delay, d2	0.6		0.2	0.0	0.4						0.2	
Delay (s)	20.6		19.9	25.1	18.9						9.3	
Level of Service	C		B	C	B						A	
Approach Delay (s)		20.0			20.0			0.0			9.3	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	32.7%	ICU Level of Service	A
Analysis Period (min)	15		

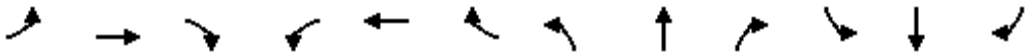
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	170	418	60	227	375	0	0	304	157
Future Volume (vph)	0	0	0	170	418	60	227	375	0	0	304	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				5.0	5.0		5.0	5.0			5.0	
Lane Util. Factor				1.00	0.95		1.00	0.95			0.95	
Frpb, ped/bikes				1.00	1.00		1.00	1.00			0.99	
Flpb, ped/bikes				0.99	1.00		1.00	1.00			1.00	
Frt				1.00	0.98		1.00	1.00			0.95	
Flt Protected				0.95	1.00		0.95	1.00			1.00	
Satd. Flow (prot)				1753	3464		1770	3539			3328	
Flt Permitted				0.95	1.00		0.46	1.00			1.00	
Satd. Flow (perm)				1753	3464		856	3539			3328	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	185	454	65	247	408	0	0	330	171
RTOR Reduction (vph)	0	0	0	0	20	0	0	0	0	0	107	0
Lane Group Flow (vph)	0	0	0	185	499	0	247	408	0	0	394	0
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Perm	NA		Perm	NA			NA	
Protected Phases					8			2			6	
Permitted Phases				8			2					
Actuated Green, G (s)				21.2	21.2		18.8	18.8			18.8	
Effective Green, g (s)				21.2	21.2		18.8	18.8			18.8	
Actuated g/C Ratio				0.42	0.42		0.38	0.38			0.38	
Clearance Time (s)				5.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)				3.0	3.0		4.0	4.0			4.0	
Lane Grp Cap (vph)				743	1468		321	1330			1251	
v/s Ratio Prot					c0.14			0.12			0.12	
v/s Ratio Perm				0.11			c0.29					
v/c Ratio				0.25	0.34		0.77	0.31			0.32	
Uniform Delay, d1				9.3	9.7		13.7	11.0			11.0	
Progression Factor				1.00	1.00		1.00	1.00			1.06	
Incremental Delay, d2				0.8	0.6		11.2	0.2			0.2	
Delay (s)				10.1	10.3		24.9	11.2			11.9	
Level of Service				B	B		C	B			B	
Approach Delay (s)		0.0			10.3			16.4			11.9	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	156	0	155	769	314	18	95	372	438	62	23
Future Volume (vph)	20	156	0	155	769	314	18	95	372	438	62	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539		1770	3539	1583		1848	1583	1681	1689	
Flt Permitted	0.27	1.00		0.64	1.00	1.00		0.93	1.00	0.68	0.72	
Satd. Flow (perm)	512	3539		1200	3539	1583		1727	1583	1200	1261	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	170	0	168	836	341	20	103	404	476	67	25
RTOR Reduction (vph)	0	0	0	0	0	201	0	0	254	0	7	0
Lane Group Flow (vph)	22	170	0	168	836	140	0	123	150	281	280	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	18.6	18.6		18.2	18.2	18.2		16.5	16.5	16.5	16.5	
Effective Green, g (s)	18.6	18.6		18.2	18.2	18.2		16.5	16.5	16.5	16.5	
Actuated g/C Ratio	0.42	0.42		0.41	0.41	0.41		0.37	0.37	0.37	0.37	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	214	1485		493	1453	650		643	589	446	469	
v/s Ratio Prot		0.05			c0.24							
v/s Ratio Perm	0.04			0.14		0.09		0.07	0.10	c0.23	0.22	
v/c Ratio	0.10	0.11		0.34	0.58	0.22		0.19	0.26	0.63	0.60	
Uniform Delay, d1	7.8	7.8		8.9	10.1	8.4		9.4	9.6	11.4	11.2	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.0		0.5	0.6	0.2		0.2	0.3	3.2	2.4	
Delay (s)	8.1	7.9		9.4	10.7	8.6		9.6	10.0	14.6	13.6	
Level of Service	A	A		A	B	A		A	A	B	B	
Approach Delay (s)		7.9			10.0			9.9			14.1	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	10.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	44.3	Sum of lost time (s)	9.6
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

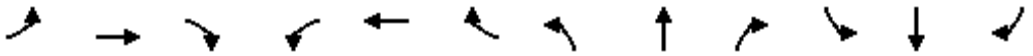
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	441	42	61	91	65	77
Future Volume (Veh/h)	441	42	61	91	65	77
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	479	46	66	99	71	84
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				248		
pX, platoon unblocked						
vC, conflicting volume			525		733	502
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			525		733	502
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		80	85
cM capacity (veh/h)			1042		363	569

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	525	165	155
Volume Left	0	66	71
Volume Right	46	0	84
cSH	1700	1042	452
Volume to Capacity	0.31	0.06	0.34
Queue Length 95th (ft)	0	5	38
Control Delay (s)	0.0	3.8	17.1
Lane LOS		A	C
Approach Delay (s)	0.0	3.8	17.1
Approach LOS			C

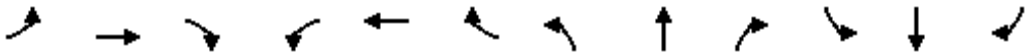
Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	52.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	340	228	219	0	0	0	91	288	148	156	247	111
Future Volume (vph)	340	228	219	0	0	0	91	288	148	156	247	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00					1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.98					1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00					1.00	1.00		1.00	1.00	
Frt	1.00	0.93					1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1697					1770	3335		1770	3329	
Flt Permitted	0.95	1.00					0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1697					1770	3335		1770	3329	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	370	248	238	0	0	0	99	313	161	170	268	121
RTOR Reduction (vph)	0	58	0	0	0	0	0	121	0	0	80	0
Lane Group Flow (vph)	370	428	0	0	0	0	99	353	0	170	309	0
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA					Prot	NA		Prot	NA	
Protected Phases	4	4					5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	19.8	19.8					7.0	14.0		13.2	20.2	
Effective Green, g (s)	19.8	19.8					7.0	14.0		13.2	20.2	
Actuated g/C Ratio	0.33	0.33					0.12	0.23		0.22	0.34	
Clearance Time (s)	4.2	4.2					4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0					3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	584	560					206	778		389	1120	
v/s Ratio Prot	0.21	c0.25					0.06	c0.11		c0.10	0.09	
v/s Ratio Perm												
v/c Ratio	0.63	0.76					0.48	0.45		0.44	0.28	
Uniform Delay, d1	17.0	18.0					24.8	19.7		20.2	14.6	
Progression Factor	1.00	1.00					1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.2	9.6					7.8	1.9		3.5	0.6	
Delay (s)	22.2	27.6					32.6	21.6		23.7	15.2	
Level of Service	C	C					C	C		C	B	
Approach Delay (s)		25.3			0.0			23.5			17.8	
Approach LOS		C			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	60.9%	ICU Level of Service	B
Analysis Period (min)	15		

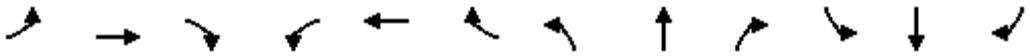
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	562	34	0	0	0	0	10	33	33	28	0
Future Volume (Veh/h)	18	562	34	0	0	0	0	10	33	33	28	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	611	37	0	0	0	0	11	36	36	30	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		255										
pX, platoon unblocked												
vC, conflicting volume	0			648			684	670	324	387	688	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			648			684	670	324	387	688	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	95	93	92	100
cM capacity (veh/h)	1622			934			310	372	672	500	363	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	326	342	47	66
Volume Left	20	0	0	36
Volume Right	0	37	36	0
cSH	1622	1700	565	427
Volume to Capacity	0.01	0.20	0.08	0.15
Queue Length 95th (ft)	1	0	7	14
Control Delay (s)	0.5	0.0	11.9	15.0
Lane LOS	A		B	B
Approach Delay (s)	0.3		11.9	15.0
Approach LOS			B	B

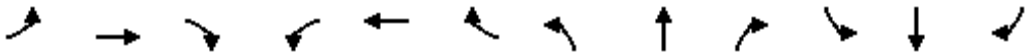
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	33.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	71	954	26	0	0	0	0	28	25	78	102	0
Future Volume (vph)	71	954	26	0	0	0	0	28	25	78	102	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	77	1037	28	0	0	0	0	30	27	85	111	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	596	547	57	196
Volume Left (vph)	77	0	0	85
Volume Right (vph)	0	28	27	0
Hadj (s)	0.10	0.00	-0.25	0.12
Departure Headway (s)	5.4	5.3	5.9	6.0
Degree Utilization, x	0.89	0.80	0.09	0.33
Capacity (veh/h)	661	672	593	590
Control Delay (s)	35.1	24.9	9.5	11.9
Approach Delay (s)	30.2		9.5	11.9
Approach LOS	D		A	B

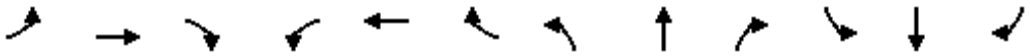
Intersection Summary				
Delay	26.8			
Level of Service	D			
Intersection Capacity Utilization	52.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	171	535	15	48	0	13	0	16	13	0	0	0
Future Volume (vph)	171	535	15	48	0	13	0	16	13	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	186	582	16	52	0	14	0	17	14	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	186	598	66	31
Volume Left (vph)	186	0	52	0
Volume Right (vph)	0	16	14	14
Hadj (s)	0.53	0.02	0.06	-0.24
Departure Headway (s)	5.2	4.7	4.8	5.3
Degree Utilization, x	0.27	0.77	0.09	0.05
Capacity (veh/h)	691	761	722	628
Control Delay (s)	8.9	20.4	8.3	8.6
Approach Delay (s)	17.7		8.3	8.6
Approach LOS	C		A	A

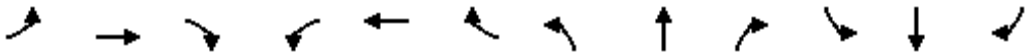
Intersection Summary				
Delay	16.7			
Level of Service	C			
Intersection Capacity Utilization	45.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	4	71	19	9	18	31	310	27	13	283	32
Future Volume (Veh/h)	21	4	71	19	9	18	31	310	27	13	283	32
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	23	4	77	21	10	20	34	337	29	14	308	35
Pedestrians		7			7						1	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			414	
pX, platoon unblocked												
vC, conflicting volume	623	802	178	688	804	191	350			373		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	623	802	178	688	804	191	350			373		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	93	99	91	93	97	98	97			99		
cM capacity (veh/h)	336	300	829	286	299	813	1198			1175		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	104	51	202	198	168	189
Volume Left	23	21	34	0	14	0
Volume Right	77	20	0	29	0	35
cSH	595	387	1198	1700	1175	1700
Volume to Capacity	0.17	0.13	0.03	0.12	0.01	0.11
Queue Length 95th (ft)	16	11	2	0	1	0
Control Delay (s)	12.3	15.7	1.6	0.0	0.8	0.0
Lane LOS	B	C	A		A	
Approach Delay (s)	12.3	15.7	0.8		0.4	
Approach LOS	B	C				

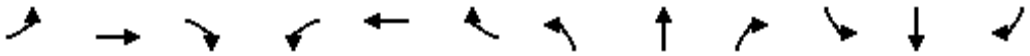
Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	37.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	0	38	10	0	9	25	335	14	18	304	33
Future Volume (Veh/h)	8	0	38	10	0	9	25	335	14	18	304	33
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	0	41	11	0	10	27	364	15	20	330	36
Pedestrians		11			7						12	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		1			1						1	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								831			844	
pX, platoon unblocked												
vC, conflicting volume	657	839	194	678	850	208	377			386		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	657	839	194	678	850	208	377			386		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	95	96	100	99	98			98		
cM capacity (veh/h)	325	284	807	306	280	785	1167			1162		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	50	21	209	197	185	201
Volume Left	9	11	27	0	20	0
Volume Right	41	10	0	15	0	36
cSH	637	431	1167	1700	1162	1700
Volume to Capacity	0.08	0.05	0.02	0.12	0.02	0.12
Queue Length 95th (ft)	6	4	2	0	1	0
Control Delay (s)	11.1	13.8	1.2	0.0	1.0	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	11.1	13.8	0.6		0.5	
Approach LOS	B	B				

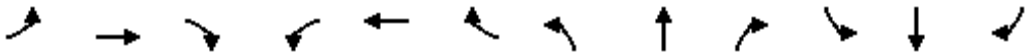
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	38.8%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	126	164	97	81	14	121	14	283	65	144	174	7
Future Volume (vph)	126	164	97	81	14	121	14	283	65	144	174	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	137	178	105	88	15	132	15	308	71	157	189	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	420	235	394	354
Volume Left (vph)	137	88	15	157
Volume Right (vph)	105	132	71	8
Hadj (s)	-0.05	-0.23	-0.07	0.11
Departure Headway (s)	7.8	8.4	7.9	8.2
Degree Utilization, x	0.91	0.55	0.86	0.81
Capacity (veh/h)	420	384	441	415
Control Delay (s)	51.3	21.4	43.5	37.3
Approach Delay (s)	51.3	21.4	43.5	37.3
Approach LOS	F	C	E	E

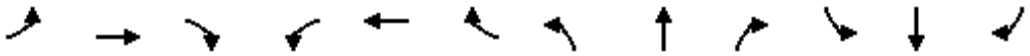
Intersection Summary				
Delay	40.6			
Level of Service	E			
Intersection Capacity Utilization	73.9%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	197	23	10	137	35	22	46	35	28	61	13
Future Volume (Veh/h)	12	197	23	10	137	35	22	46	35	28	61	13
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	214	25	11	149	38	24	50	38	30	66	14
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	201			246			498	482	234	520	476	183
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	201			246			498	482	234	520	476	183
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			94	89	95	92	86	98
cM capacity (veh/h)	1355			1312			410	467	801	393	471	849

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	252	198	112	110
Volume Left	13	11	24	30
Volume Right	25	38	38	14
cSH	1355	1312	526	472
Volume to Capacity	0.01	0.01	0.21	0.23
Queue Length 95th (ft)	1	1	20	22
Control Delay (s)	0.5	0.5	13.7	14.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.5	0.5	13.7	14.9
Approach LOS			B	B

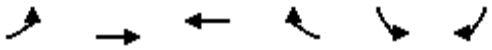
Intersection Summary				
Average Delay	5.1			
Intersection Capacity Utilization	30.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	124	118	128	99	22	104	261	140	24	261	32
Future Volume (vph)	65	124	118	128	99	22	104	261	140	24	261	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Lane Util. Factor	1.00	1.00			1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.93			0.99		1.00	0.95		1.00	0.98	
Flt Protected	0.95	1.00			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1727			1794		1770	3354		1770	3481	
Flt Permitted	0.60	1.00			0.60		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1119	1727			1113		1770	3354		1770	3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	135	128	139	108	24	113	284	152	26	284	35
RTOR Reduction (vph)	0	66	0	0	7	0	0	84	0	0	15	0
Lane Group Flow (vph)	71	197	0	0	264	0	113	352	0	26	304	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	11.4	11.4			11.4		4.8	20.5		0.6	16.3	
Effective Green, g (s)	11.4	11.4			11.4		4.8	20.5		0.6	16.3	
Actuated g/C Ratio	0.25	0.25			0.25		0.11	0.45		0.01	0.36	
Clearance Time (s)	4.2	4.2			4.2		4.2	4.6		4.2	4.6	
Vehicle Extension (s)	3.0	3.0			3.0		3.0	4.0		3.0	4.0	
Lane Grp Cap (vph)	280	432			278		186	1511		23	1247	
v/s Ratio Prot		0.11					c0.06	c0.11		0.01	0.09	
v/s Ratio Perm	0.06				c0.24							
v/c Ratio	0.25	0.46			0.95		0.61	0.23		1.13	0.24	
Uniform Delay, d1	13.6	14.4			16.8		19.4	7.7		22.4	10.3	
Progression Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.8			40.6		5.5	0.1		231.0	0.1	
Delay (s)	14.1	15.2			57.3		25.0	7.8		253.5	10.4	
Level of Service	B	B			E		C	A		F	B	
Approach Delay (s)		15.0			57.3			11.3			28.7	
Approach LOS		B			E			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	45.5	Sum of lost time (s)	13.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		

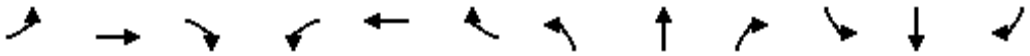
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	420	312	54	81	82
Future Volume (Veh/h)	19	420	312	54	81	82
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	457	339	59	88	89
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	406				876	378
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	406				876	378
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				72	87
cM capacity (veh/h)	1145				311	664

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	478	398	177
Volume Left	21	0	88
Volume Right	0	59	89
cSH	1145	1700	424
Volume to Capacity	0.02	0.23	0.42
Queue Length 95th (ft)	1	0	50
Control Delay (s)	0.6	0.0	19.4
Lane LOS	A		C
Approach Delay (s)	0.6	0.0	19.4
Approach LOS			C

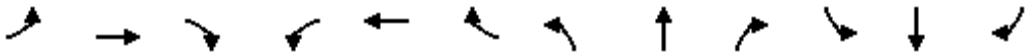
Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	467	4	2	311	24	2	1	3	35	0	30
Future Volume (Veh/h)	22	467	4	2	311	24	2	1	3	35	0	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	508	4	2	338	26	2	1	3	38	0	33
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	366			512			948	928	510	918	917	355
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	366			512			948	928	510	918	917	355
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			99	100	99	84	100	95
cM capacity (veh/h)	1191			1053			225	262	563	245	266	687

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	536	366	6	71
Volume Left	24	2	2	38
Volume Right	4	26	3	33
cSH	1191	1053	332	350
Volume to Capacity	0.02	0.00	0.02	0.20
Queue Length 95th (ft)	2	0	1	19
Control Delay (s)	0.6	0.1	16.0	17.9
Lane LOS	A	A	C	C
Approach Delay (s)	0.6	0.1	16.0	17.9
Approach LOS			C	C

Intersection Summary				
Average Delay	1.7			
Intersection Capacity Utilization	53.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	1	246	273	75	177	1	163	1	105	0	1	0
Future Volume (vph)	1	246	273	75	177	1	163	1	105	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	267	297	82	192	1	177	1	114	0	1	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	565	275	292	1
Volume Left (vph)	1	82	177	0
Volume Right (vph)	297	1	114	0
Hadj (s)	-0.28	0.09	-0.08	0.03
Departure Headway (s)	5.0	5.7	5.9	6.9
Degree Utilization, x	0.78	0.44	0.48	0.00
Capacity (veh/h)	699	593	556	440
Control Delay (s)	23.7	13.1	14.4	9.9
Approach Delay (s)	23.7	13.1	14.4	9.9
Approach LOS	C	B	B	A

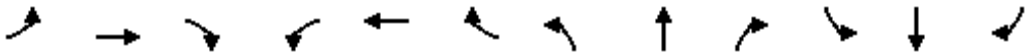
Intersection Summary				
Delay	18.7			
Level of Service	C			
Intersection Capacity Utilization	76.0%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	64	128	216	94	92	210
Future Volume (vph)	64	128	216	94	92	210
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	70	139	235	102	100	228

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	209	337	328
Volume Left (vph)	70	0	100
Volume Right (vph)	139	102	0
Hadj (s)	-0.30	-0.15	0.09
Departure Headway (s)	5.2	4.8	5.0
Degree Utilization, x	0.30	0.45	0.46
Capacity (veh/h)	630	724	689
Control Delay (s)	10.4	11.5	12.1
Approach Delay (s)	10.4	11.5	12.1
Approach LOS	B	B	B

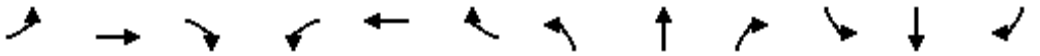
Intersection Summary			
Delay	11.5		
Level of Service	B		
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	322	33	34	266	95	46	68	66	104	41	27
Future Volume (Veh/h)	18	322	33	34	266	95	46	68	66	104	41	27
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	350	36	37	289	103	50	74	72	113	45	29
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					253							
pX, platoon unblocked	0.89						0.89	0.89		0.89	0.89	0.89
vC, conflicting volume	395			397			889	888	387	942	854	348
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	256			397			812	811	387	873	774	203
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			97			76	72	89	29	84	96
cM capacity (veh/h)	1160			1151			209	262	651	158	275	740

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	406	429	196	187
Volume Left	20	37	50	113
Volume Right	36	103	72	29
cSH	1160	1151	310	204
Volume to Capacity	0.02	0.03	0.63	0.92
Queue Length 95th (ft)	1	2	101	184
Control Delay (s)	0.6	1.0	34.6	91.0
Lane LOS	A	A	D	F
Approach Delay (s)	0.6	1.0	34.6	91.0
Approach LOS			D	F

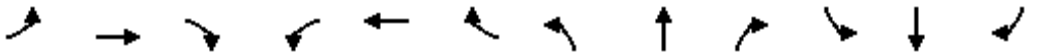
Intersection Summary				
Average Delay	20.1			
Intersection Capacity Utilization	59.2%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	198	79	201	192	151	83	454	129	155	386	26
Future Volume (vph)	50	198	79	201	192	151	83	454	129	155	386	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	0.96	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844	1536	1681	1761	1524	1770	3409		1770	3492	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1844	1536	1681	1761	1524	1770	3409		1770	3492	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	215	86	218	209	164	90	493	140	168	420	28
RTOR Reduction (vph)	0	0	70	0	0	134	0	32	0	0	6	0
Lane Group Flow (vph)	0	269	16	196	231	30	90	602	0	168	442	0
Confl. Peds. (#/hr)	14		10	10		14			3			15
Confl. Bikes (#/hr)			4			5			3			3
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		15.1	15.1	14.8	14.8	14.8	7.9	24.0		7.3	23.4	
Effective Green, g (s)		15.1	15.1	14.8	14.8	14.8	7.9	24.0		7.3	23.4	
Actuated g/C Ratio		0.19	0.19	0.19	0.19	0.19	0.10	0.30		0.09	0.29	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.5		2.0	3.5	
Lane Grp Cap (vph)		348	289	310	325	281	174	1022		161	1021	
v/s Ratio Prot		c0.15		0.12	c0.13		0.05	c0.18		c0.09	0.13	
v/s Ratio Perm			0.01			0.02						
v/c Ratio		0.77	0.06	0.63	0.71	0.11	0.52	0.59		1.04	0.43	
Uniform Delay, d1		30.8	26.6	30.1	30.6	27.1	34.2	23.8		36.4	22.9	
Progression Factor		1.00	1.00	1.00	1.00	1.00	0.73	0.38		1.00	1.00	
Incremental Delay, d2		9.4	0.0	4.4	7.4	0.2	1.0	2.2		82.9	1.3	
Delay (s)		40.2	26.6	34.4	38.0	27.3	26.0	11.2		119.2	24.3	
Level of Service		D	C	C	D	C	C	B		F	C	
Approach Delay (s)		36.9			33.8			13.1			50.2	
Approach LOS		D			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	32.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

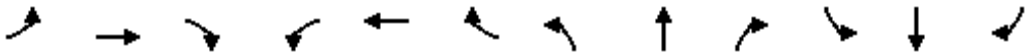
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	526	10	37	585	174	15	21	95	326	17	80
Future Volume (vph)	40	526	10	37	585	174	15	21	95	326	17	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3527		1760	3406			3103			1777	1527
Flt Permitted	0.22	1.00		0.36	1.00			0.91			0.63	1.00
Satd. Flow (perm)	409	3527		666	3406			2841			1177	1527
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	572	11	40	636	189	16	23	103	354	18	87
RTOR Reduction (vph)	0	3	0	0	58	0	0	52	0	0	0	44
Lane Group Flow (vph)	43	580	0	40	767	0	0	90	0	0	372	43
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	18.2	18.2		18.2	18.2			27.3			27.3	27.3
Effective Green, g (s)	18.2	18.2		18.2	18.2			27.3			27.3	27.3
Actuated g/C Ratio	0.33	0.33		0.33	0.33			0.50			0.50	0.50
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	135	1167		220	1127			1410			584	757
v/s Ratio Prot		0.16			c0.23							
v/s Ratio Perm	0.11			0.06				0.03			c0.32	0.03
v/c Ratio	0.32	0.50		0.18	0.68			0.06			0.64	0.06
Uniform Delay, d1	13.8	14.7		13.1	15.9			7.2			10.2	7.2
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	1.4	0.3		0.4	1.7			0.1			5.2	0.1
Delay (s)	15.1	15.1		13.5	17.6			7.3			15.4	7.3
Level of Service	B	B		B	B			A			B	A
Approach Delay (s)		15.1			17.4			7.3			13.9	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		

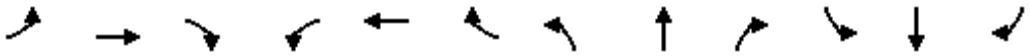
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	20	16	76	20	260	21	505	139	332	526	20
Future Volume (vph)	44	20	16	76	20	260	21	505	139	332	526	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750			1787	1547	1770	3403		1770	3515	
Flt Permitted		0.81			0.76	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1460			1410	1547	1770	3403		1770	3515	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	22	17	83	22	283	23	549	151	361	572	22
RTOR Reduction (vph)	0	11	0	0	0	212	0	38	0	0	3	0
Lane Group Flow (vph)	0	76	0	0	105	71	23	662	0	361	591	0
Confl. Peds. (#/hr)	10		4	4		10			3			4
Confl. Bikes (#/hr)			1						2			3
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		20.1			20.1	20.1	1.9	18.5		27.7	44.3	
Effective Green, g (s)		20.1			20.1	20.1	1.9	18.5		27.7	44.3	
Actuated g/C Ratio		0.25			0.25	0.25	0.02	0.23		0.35	0.55	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		366			354	388	42	786		612	1946	
v/s Ratio Prot							0.01	c0.19		c0.20	0.17	
v/s Ratio Perm		0.05			c0.07	0.05						
v/c Ratio		0.21			0.30	0.18	0.55	0.84		0.59	0.30	
Uniform Delay, d1		23.7			24.2	23.5	38.6	29.4		21.5	9.6	
Progression Factor		1.00			1.00	1.00	1.00	1.00		0.86	0.51	
Incremental Delay, d2		1.3			2.1	1.0	13.8	8.1		1.4	0.1	
Delay (s)		24.9			26.4	24.5	52.4	37.5		19.8	4.9	
Level of Service		C			C	C	D	D		B	A	
Approach Delay (s)		24.9			25.0			38.0			10.5	
Approach LOS		C			C			D			B	

Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

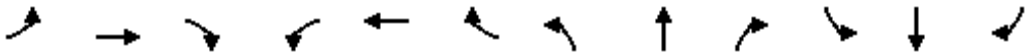
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	411	76	81	250	0	166	0	141	0	0	0
Future Volume (Veh/h)	10	411	76	81	250	0	166	0	141	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	447	83	88	272	0	180	0	153	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	272			530			958	958	488	1112	1000	272
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	272			530			958	958	488	1112	1000	272
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			92			18	100	74	100	100	100
cM capacity (veh/h)	1291			1037			220	233	579	127	221	767

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	541	360	333	0
Volume Left	11	88	180	0
Volume Right	83	0	153	0
cSH	1291	1037	308	1700
Volume to Capacity	0.01	0.08	1.08	0.00
Queue Length 95th (ft)	1	7	322	0
Control Delay (s)	0.3	2.8	112.9	0.0
Lane LOS	A	A	F	A
Approach Delay (s)	0.3	2.8	112.9	0.0
Approach LOS			F	A

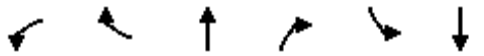
Intersection Summary			
Average Delay	31.4		
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	201	63	0	78	0	63	3	19	0	0	0
Future Volume (Veh/h)	0	201	63	0	78	0	63	3	19	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	218	68	0	85	0	68	3	21	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	85			286			337	337	252	360	371	85
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	85			286			337	337	252	360	371	85
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			89	99	97	100	100	100
cM capacity (veh/h)	1512			1276			617	584	787	578	559	974

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	286	85	92	0
Volume Left	0	0	68	0
Volume Right	68	0	21	0
cSH	1512	1276	647	1700
Volume to Capacity	0.00	0.00	0.14	0.00
Queue Length 95th (ft)	0	0	12	0
Control Delay (s)	0.0	0.0	11.5	0.0
Lane LOS			B	A
Approach Delay (s)	0.0	0.0	11.5	0.0
Approach LOS			B	A

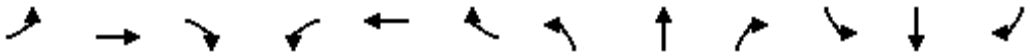
Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	25.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	76	306	23	43	365	23
Future Volume (vph)	76	306	23	43	365	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	83	333	25	47	397	25

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	416	72	422
Volume Left (vph)	83	0	397
Volume Right (vph)	333	47	0
Hadj (s)	-0.41	-0.36	0.22
Departure Headway (s)	4.8	5.3	5.3
Degree Utilization, x	0.56	0.11	0.63
Capacity (veh/h)	708	610	650
Control Delay (s)	13.8	8.9	16.8
Approach Delay (s)	13.8	8.9	16.8
Approach LOS	B	A	C

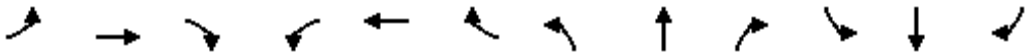
Intersection Summary			
Delay	14.8		
Level of Service	B		
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	414	175	28	325	25	239	29	37	7	21	36
Future Volume (Veh/h)	14	414	175	28	325	25	239	29	37	7	21	36
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	450	190	30	353	27	260	32	40	8	23	39
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	380			640			1052	1015	545	1058	1096	366
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	380			640			1052	1015	545	1058	1096	366
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			0	86	93	95	89	94
cM capacity (veh/h)	1178			944			170	228	538	162	204	679

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	655	410	332	70
Volume Left	15	30	260	8
Volume Right	190	27	40	39
cSH	1178	944	191	319
Volume to Capacity	0.01	0.03	1.74	0.22
Queue Length 95th (ft)	1	2	577	21
Control Delay (s)	0.3	1.0	397.4	19.5
Lane LOS	A	A	F	C
Approach Delay (s)	0.3	1.0	397.4	19.5
Approach LOS			F	C

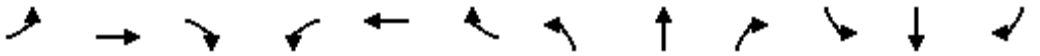
Intersection Summary				
Average Delay	91.3			
Intersection Capacity Utilization	66.5%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	233	6	17	194	29	3	8	16	13	3	3
Future Volume (Veh/h)	3	233	6	17	194	29	3	8	16	13	3	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	253	7	18	211	32	3	9	17	14	3	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	243			260			530	542	256	547	529	227
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	243			260			530	542	256	547	529	227
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	98	98	97	99	100
cM capacity (veh/h)	1323			1304			450	441	782	426	448	812

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	263	261	29	20
Volume Left	3	18	3	14
Volume Right	7	32	17	3
cSH	1323	1304	594	462
Volume to Capacity	0.00	0.01	0.05	0.04
Queue Length 95th (ft)	0	1	4	3
Control Delay (s)	0.1	0.7	11.4	13.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	0.7	11.4	13.1
Approach LOS			B	B

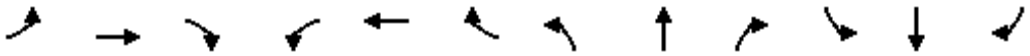
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	33.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	88	96	76	51	11	106	412	35	43	327	37
Future Volume (vph)	103	88	96	76	51	11	106	412	35	43	327	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.95			0.99		1.00	0.99		1.00	0.98	
Flt Protected		0.98			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1748			1793		1770	3498		1770	3485	
Flt Permitted		0.83			0.63		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1484			1153		1770	3498		1770	3485	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	112	96	104	83	55	12	115	448	38	47	355	40
RTOR Reduction (vph)	0	27	0	0	4	0	0	8	0	0	10	0
Lane Group Flow (vph)	0	285	0	0	146	0	115	478	0	47	385	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		18.3			17.9		10.6	31.1		6.0	27.3	
Effective Green, g (s)		18.3			17.9		10.6	31.1		6.0	27.3	
Actuated g/C Ratio		0.26			0.26		0.15	0.44		0.09	0.39	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		387			294		268	1554		151	1359	
v/s Ratio Prot							c0.06	c0.14		0.03	c0.11	
v/s Ratio Perm		c0.19			0.13							
v/c Ratio		0.74			0.50		0.43	0.31		0.31	0.28	
Uniform Delay, d1		23.7			22.2		27.0	12.5		30.1	14.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		7.2			1.5		0.4	0.5		1.2	0.5	
Delay (s)		30.8			23.7		27.4	13.0		31.2	15.2	
Level of Service		C			C		C	B		C	B	
Approach Delay (s)		30.8			23.7			15.8			16.9	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

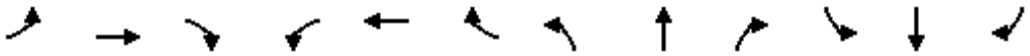
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	52	761	73	81	343	32	84	118	37	50	46	52
Future Volume (Veh/h)	52	761	73	81	343	32	84	118	37	50	46	52
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	57	827	79	88	373	35	91	128	40	54	50	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	408			906			1629	1564	866	1651	1586	390
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	408			906			1629	1564	866	1651	1586	390
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			88			0	0	89	0	45	91
cM capacity (veh/h)	1151			751			37	94	353	0	91	658

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	963	496	259	161
Volume Left	57	88	91	54
Volume Right	79	35	40	57
cSH	1151	751	66	0
Volume to Capacity	0.05	0.12	3.92	Err
Queue Length 95th (ft)	4	10	Err	Err
Control Delay (s)	1.3	3.2	Err	Err
Lane LOS	A	A	F	F
Approach Delay (s)	1.3	3.2	Err	Err
Approach LOS			F	F

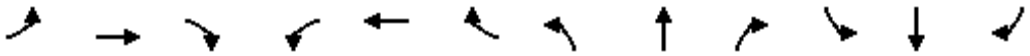
Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	75.8%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	124	30	37	59	3	40	50	37	4	22	6
Future Volume (vph)	10	124	30	37	59	3	40	50	37	4	22	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	135	33	40	64	3	43	54	40	4	24	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	179	107	137	35
Volume Left (vph)	11	40	43	4
Volume Right (vph)	33	3	40	7
Hadj (s)	-0.06	0.09	-0.08	-0.06
Departure Headway (s)	4.4	4.6	4.5	4.7
Degree Utilization, x	0.22	0.14	0.17	0.05
Capacity (veh/h)	789	737	746	707
Control Delay (s)	8.6	8.3	8.5	7.9
Approach Delay (s)	8.6	8.3	8.5	7.9
Approach LOS	A	A	A	A

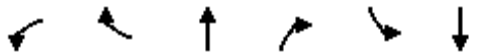
Intersection Summary				
Delay	8.4			
Level of Service	A			
Intersection Capacity Utilization	37.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	163	18	90	70	45	18	124	203	86	26	5
Future Volume (vph)	20	163	18	90	70	45	18	124	203	86	26	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	177	20	98	76	49	20	135	221	93	28	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	219	223	376	126
Volume Left (vph)	22	98	20	93
Volume Right (vph)	20	49	221	5
Hadj (s)	0.00	-0.01	-0.31	0.16
Departure Headway (s)	5.7	5.7	5.1	6.0
Degree Utilization, x	0.35	0.35	0.53	0.21
Capacity (veh/h)	573	576	660	522
Control Delay (s)	11.7	11.7	13.8	10.6
Approach Delay (s)	11.7	11.7	13.8	10.6
Approach LOS	B	B	B	B

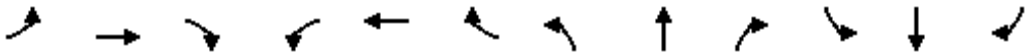
Intersection Summary				
Delay	12.4			
Level of Service	B			
Intersection Capacity Utilization	61.9%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	178	171	12	118	65
Future Volume (vph)	0	178	171	12	118	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	193	186	13	128	71

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	193	199	199
Volume Left (vph)	0	0	128
Volume Right (vph)	193	13	0
Hadj (s)	-0.57	-0.01	0.16
Departure Headway (s)	4.3	4.6	4.7
Degree Utilization, x	0.23	0.25	0.26
Capacity (veh/h)	776	748	721
Control Delay (s)	8.5	9.1	9.4
Approach Delay (s)	8.5	9.1	9.4
Approach LOS	A	A	A

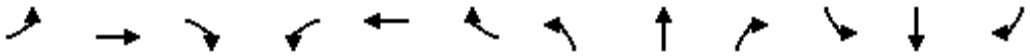
Intersection Summary			
Delay	9.0		
Level of Service	A		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	212	65	266	169	465	73	494	352	389	415	36
Future Volume (vph)	30	212	65	266	169	465	73	494	352	389	415	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.97		1.00	1.00	1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.94		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1863	1540		1808	1583	1770	3260		1770	3481	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1863	1540		1808	1583	1770	3260		1770	3481	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	230	71	289	184	505	79	537	383	423	451	39
RTOR Reduction (vph)	0	0	62	0	0	266	0	99	0	0	6	0
Lane Group Flow (vph)	33	230	9	0	473	239	79	821	0	423	484	0
Confl. Peds. (#/hr)	7		2	2		7			5			8
Confl. Bikes (#/hr)						2			4			8
Turn Type	Split	NA	Perm	Split	NA	pm+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	1	5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	16.7	16.7	16.7		33.4	28.8	26.7	32.0		28.8	34.1	
Effective Green, g (s)	16.7	16.7	16.7		33.4	28.8	26.7	32.0		28.8	34.1	
Actuated g/C Ratio	0.13	0.13	0.13		0.26	0.22	0.21	0.25		0.22	0.26	
Clearance Time (s)	5.0	5.0	5.0		4.9	4.2	4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0	2.0	2.0	3.0		2.0	3.0	
Lane Grp Cap (vph)	227	239	197		464	350	363	802		392	913	
v/s Ratio Prot	0.02	c0.12			c0.26	0.15	0.04	c0.25		c0.24	0.14	
v/s Ratio Perm			0.01									
v/c Ratio	0.15	0.96	0.05		1.02	0.68	0.22	1.02		1.08	0.53	
Uniform Delay, d1	50.3	56.3	49.7		48.3	46.4	43.0	49.0		50.6	41.1	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	47.2	0.0		46.8	4.3	0.1	38.0		68.3	2.2	
Delay (s)	50.4	103.5	49.7		95.1	50.7	43.1	87.0		118.9	43.3	
Level of Service	D	F	D		F	D	D	F		F	D	
Approach Delay (s)		86.8			72.2			83.5			78.3	
Approach LOS		F			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	78.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	19.1
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		

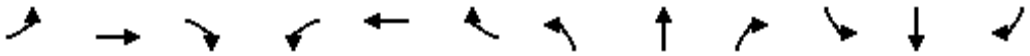
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	1239	17	22	1191	163	11	0	22	76	11	173
Future Volume (Veh/h)	29	1239	17	22	1191	163	11	0	22	76	11	173
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	1347	18	24	1295	177	12	0	24	83	12	188
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		279										
pX, platoon unblocked				0.88			0.88	0.88	0.88	0.88	0.88	
vC, conflicting volume	1472			1365			3046	2940	1356	2876	2860	1384
vC1, stage 1 conf vol							1420	1420		1432	1432	
vC2, stage 2 conf vol							1626	1520		1444	1429	
vCu, unblocked vol	1472			1346			3258	3138	1336	3065	3048	1384
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			95			0	100	85	0	89	0
cM capacity (veh/h)	458			450			0	101	165	75	108	176

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1397	1496	36	283
Volume Left	32	24	12	83
Volume Right	18	177	24	188
cSH	458	450	0	124
Volume to Capacity	0.07	0.05	Err	2.28
Queue Length 95th (ft)	6	4	Err	607
Control Delay (s)	5.0	5.5	Err	659.9
Lane LOS	A	A	F	F
Approach Delay (s)	5.0	5.5	Err	659.9
Approach LOS			F	F

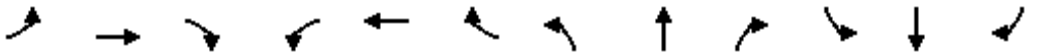
Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	109.4%	ICU Level of Service	H	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	6	1611	9	22	1585	38	2	2	35	15	2	9
Future Volume (Veh/h)	6	1611	9	22	1585	38	2	2	35	15	2	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	1751	10	24	1723	41	2	2	38	16	2	10
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.89			0.89	0.89	0.89	0.89	0.89	
vC, conflicting volume	1764			1762			3554	3583	1757	3596	3568	1744
vC1, stage 1 conf vol							1771	1771		1792	1792	
vC2, stage 2 conf vol							1783	1812		1804	1776	
vCu, unblocked vol	1764			1795			3816	3848	1790	3862	3831	1744
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			92			96	97	57	26	97	91
cM capacity (veh/h)	354			305			54	75	89	22	67	107

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	7	1761	24	1764	42	28
Volume Left	7	0	24	0	2	16
Volume Right	0	10	0	41	38	10
cSH	354	1700	305	1700	86	33
Volume to Capacity	0.02	1.04	0.08	1.04	0.49	0.86
Queue Length 95th (ft)	2	0	6	0	52	74
Control Delay (s)	15.4	0.0	17.8	0.0	82.0	294.2
Lane LOS	C		C		F	F
Approach Delay (s)	0.1		0.2		82.0	294.2
Approach LOS					F	F

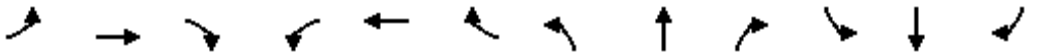
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	100.1%	ICU Level of Service		G
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	1417	0	19	1459	503	0	0	11	0	0	34
Future Volume (Veh/h)	20	1417	0	19	1459	503	0	0	11	0	0	34
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	1540	0	21	1586	547	0	0	12	0	0	37
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2133			1540			3249	3759	1540	3498	3486	1860
vC1, stage 1 conf vol							1584	1584		1902	1902	
vC2, stage 2 conf vol							1665	2175		1596	1584	
vCu, unblocked vol	2133			1540			3249	3759	1540	3498	3486	1860
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			95			100	100	92	100	100	59
cM capacity (veh/h)	254			431			42	53	142	58	80	91

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	22	1540	21	2133	12	37
Volume Left	22	0	21	0	0	0
Volume Right	0	0	0	547	12	37
cSH	254	1700	431	1700	142	91
Volume to Capacity	0.09	0.91	0.05	1.25	0.08	0.41
Queue Length 95th (ft)	7	0	4	0	7	41
Control Delay (s)	20.5	0.0	13.8	0.0	32.7	69.1
Lane LOS	C		B		D	F
Approach Delay (s)	0.3		0.1		32.7	69.1
Approach LOS					D	F

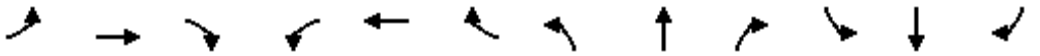
Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	124.1%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	117	0	0	19	122	773	4	19	620	11
Future Volume (Veh/h)	0	0	117	0	0	19	122	773	4	19	620	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	127	0	0	21	133	840	4	21	674	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked	0.85	0.85	0.85	0.85	0.85		0.85					
vC, conflicting volume	1429	1832	680	1951	1836	422	686			844		
vC1, stage 1 conf vol	722	722		1108	1108							
vC2, stage 2 conf vol	707	1110		843	728							
vCu, unblocked vol	1417	1889	538	2029	1894	422	545			844		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	69	100	100	96	85			97		
cM capacity (veh/h)	239	192	416	77	182	580	870			788		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	127	21	133	560	284	21	686
Volume Left	0	0	133	0	0	21	0
Volume Right	127	21	0	0	4	0	12
cSH	416	580	870	1700	1700	788	1700
Volume to Capacity	0.31	0.04	0.15	0.33	0.17	0.03	0.40
Queue Length 95th (ft)	32	3	13	0	0	2	0
Control Delay (s)	17.4	11.4	9.9	0.0	0.0	9.7	0.0
Lane LOS	C	B	A			A	
Approach Delay (s)	17.4	11.4	1.3			0.3	
Approach LOS	C	B					

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	47.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	25	25	16	3	8	8	342	14	6	342	15
Future Volume (vph)	55	25	25	16	3	8	8	342	14	6	342	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5		4.5	4.5		4.5			4.5	
Lane Util. Factor		1.00	1.00		1.00	1.00		0.95			0.95	
Frt		1.00	0.85		1.00	0.85		0.99			0.99	
Flt Protected		0.97	1.00		0.96	1.00		1.00			1.00	
Satd. Flow (prot)		1801	1583		1787	1583		3515			3515	
Flt Permitted		0.78	1.00		0.70	1.00		0.95			0.95	
Satd. Flow (perm)		1456	1583		1300	1583		3334			3340	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	60	27	27	17	3	9	9	372	15	7	372	16
RTOR Reduction (vph)	0	0	24	0	0	8	0	4	0	0	4	0
Lane Group Flow (vph)	0	87	3	0	20	1	0	392	0	0	391	0
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		5.6	5.6		5.6	5.6		30.4			30.4	
Effective Green, g (s)		5.6	5.6		5.6	5.6		30.4			30.4	
Actuated g/C Ratio		0.12	0.12		0.12	0.12		0.68			0.68	
Clearance Time (s)		4.5	4.5		4.5	4.5		4.5			4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0			3.0	
Lane Grp Cap (vph)		181	196		161	196		2252			2256	
v/s Ratio Prot												
v/s Ratio Perm		c0.06	0.00		0.02	0.00		c0.12			0.12	
v/c Ratio		0.48	0.02		0.12	0.01		0.17			0.17	
Uniform Delay, d1		18.3	17.3		17.5	17.3		2.7			2.7	
Progression Factor		1.00	1.00		1.00	1.00		1.00			1.00	
Incremental Delay, d2		2.0	0.0		0.3	0.0		0.2			0.2	
Delay (s)		20.4	17.3		17.9	17.3		2.9			2.9	
Level of Service		C	B		B	B		A			A	
Approach Delay (s)		19.6			17.7			2.9			2.9	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.22		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	34.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	4	10	12	4	18	10	183	12	18	183	14
Future Volume (Veh/h)	14	4	10	12	4	18	10	183	12	18	183	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	4	11	13	4	20	11	199	13	20	199	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								836			1100	
pX, platoon unblocked												
vC, conflicting volume	390	480	107	380	482	106	214			212		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	390	480	107	380	482	106	214			212		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	99	99	98	99	98	99			99		
cM capacity (veh/h)	519	472	926	533	472	928	1353			1356		

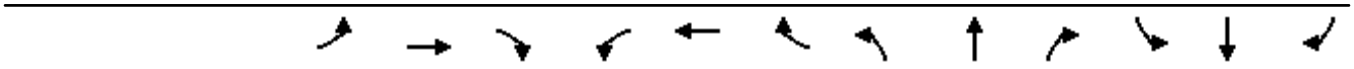
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	30	37	110	112	120	114
Volume Left	15	13	11	0	20	0
Volume Right	11	20	0	13	0	15
cSH	609	680	1353	1700	1356	1700
Volume to Capacity	0.05	0.05	0.01	0.07	0.01	0.07
Queue Length 95th (ft)	4	4	1	0	1	0
Control Delay (s)	11.2	10.6	0.8	0.0	1.4	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	11.2	10.6	0.4		0.7	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	25.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	38	44	22	30	51	23	153	21	43	132	46
Future Volume (Veh/h)	17	38	44	22	30	51	23	153	21	43	132	46
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	41	48	24	33	55	25	166	23	47	143	50
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								538			726	
pX, platoon unblocked												
vC, conflicting volume	466	501	96	462	514	94	193			189		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	466	501	96	462	514	94	193			189		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	91	95	94	92	94	98			97		
cM capacity (veh/h)	409	446	941	410	439	944	1378			1382		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	107	112	108	106	118	122
Volume Left	18	24	25	0	47	0
Volume Right	48	55	0	23	0	50
cSH	573	583	1378	1700	1382	1700
Volume to Capacity	0.19	0.19	0.02	0.06	0.03	0.07
Queue Length 95th (ft)	17	18	1	0	3	0
Control Delay (s)	12.7	12.6	1.9	0.0	3.2	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.7	12.6	1.0		1.6	
Approach LOS	B	B				

Intersection Summary				
Average Delay	5.0			
Intersection Capacity Utilization	30.5%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2214	16
Future Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2214	16
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h				112	0	0	14	1151	0	26	2407	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				631	0	281	79	3221	1003	99	2281	1020
Arrive On Green				0.18	0.00	0.00	0.04	0.63	0.00	0.06	0.64	0.00
Sat Flow, veh/h				3548	0	1583	1774	5085	1583	1774	3539	1583
Grp Volume(v), veh/h				112	0	0	14	1151	0	26	2407	0
Grp Sat Flow(s),veh/h/ln				1774	0	1583	1774	1695	1583	1774	1770	1583
Q Serve(g_s), s				2.4	0.0	0.0	0.7	9.7	0.0	1.3	58.0	0.0
Cycle Q Clear(g_c), s				2.4	0.0	0.0	0.7	9.7	0.0	1.3	58.0	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				631	0	281	79	3221	1003	99	2281	1020
V/C Ratio(X)				0.18	0.00	0.00	0.18	0.36	0.00	0.26	1.06	0.00
Avail Cap(c_a), veh/h				631	0	281	79	3221	1003	99	2281	1020
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				31.4	0.0	0.0	41.4	7.8	0.0	40.7	16.0	0.0
Incr Delay (d2), s/veh				0.6	0.0	0.0	4.9	0.3	0.0	6.4	35.5	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.2	0.0	0.0	0.4	4.6	0.0	0.8	39.1	0.0
LnGrp Delay(d),s/veh				32.0	0.0	0.0	46.3	8.1	0.0	47.2	51.5	0.0
LnGrp LOS				C			D	A		D	F	
Approach Vol, veh/h					112			1165			2433	
Approach Delay, s/veh					32.0			8.6			51.4	
Approach LOS					C			A			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	9.0	61.0			8.0	62.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	5.0	57.0			4.0	58.0		16.0
Max Q Clear Time (g_c+I1), s	3.3	11.7			2.7	60.0		4.4
Green Ext Time (p_c), s	0.0	11.0			0.0	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	37.4
HCM 2010 LOS	D

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	955	175	280	1095	0	0
Future Volume (veh/h)	955	175	280	1095	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863		
Adj Flow Rate, veh/h	1038	190	304	1190		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	2035	910	774	3185		
Arrive On Green	0.57	0.57	0.22	0.90		
Sat Flow, veh/h	3632	1583	3442	3632		
Grp Volume(v), veh/h	1038	190	304	1190		
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770		
Q Serve(g_s), s	7.1	2.3	3.0	2.0		
Cycle Q Clear(g_c), s	7.1	2.3	3.0	2.0		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2035	910	774	3185		
V/C Ratio(X)	0.51	0.21	0.39	0.37		
Avail Cap(c_a), veh/h	2035	910	774	3185		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.1	4.1	13.2	0.3		
Incr Delay (d2), s/veh	0.9	0.5	1.5	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	3.6	1.1	1.6	1.0		
LnGrp Delay(d),s/veh	6.0	4.6	14.7	0.6		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1228			1494		
Approach Delay, s/veh	5.8			3.5		
Approach LOS	A			A		

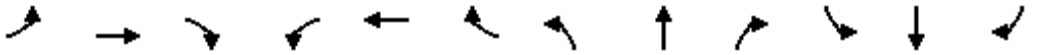
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			13.0	27.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			9.0	23.0				36.0
Max Q Clear Time (g_c+I1), s			5.0	9.1				4.0
Green Ext Time (p_c), s			0.4	6.8				11.0

Intersection Summary	
HCM 2010 Ctrl Delay	4.5
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1662	86	274	1265	138	0
Future Volume (veh/h)	1662	86	274	1265	138	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	1807	93	298	1375	150	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1809	809	612	2595	315	281
Arrive On Green	0.51	0.51	0.18	0.73	0.18	0.00
Sat Flow, veh/h	3632	1583	3442	3632	1774	1583
Grp Volume(v), veh/h	1807	93	298	1375	150	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1770	1774	1583
Q Serve(g_s), s	45.9	2.7	7.0	15.2	6.8	0.0
Cycle Q Clear(g_c), s	45.9	2.7	7.0	15.2	6.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1809	809	612	2595	315	281
V/C Ratio(X)	1.00	0.11	0.49	0.53	0.48	0.00
Avail Cap(c_a), veh/h	1809	809	612	2595	315	281
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	22.0	11.4	33.3	5.2	33.2	0.0
Incr Delay (d2), s/veh	20.9	0.3	2.8	0.8	5.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	27.3	1.3	3.5	7.5	3.8	0.0
LnGrp Delay(d),s/veh	42.9	11.7	36.1	6.0	38.3	0.0
LnGrp LOS	D	B	D	A	D	
Approach Vol, veh/h	1900			1673	150	
Approach Delay, s/veh	41.4			11.4	38.3	
Approach LOS	D			B	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	50.0				70.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	46.0				66.0
Max Q Clear Time (g_c+I1), s		8.8	9.0	47.9				17.2
Green Ext Time (p_c), s		0.2	0.6	0.0				15.5

Intersection Summary	
HCM 2010 Ctrl Delay	27.8
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	676	6	88	629	119	5	0	34	85	9	54
Future Volume (veh/h)	0	676	6	88	629	119	5	0	34	85	9	54
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	1863	1863	0	1863	1863	1863	1863
Adj Flow Rate, veh/h	0	735	7	96	684	0	5	0	37	99	0	59
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1268	12	174	1874	838	0	0	0	1113	0	497
Arrive On Green	0.00	0.35	0.35	0.10	0.53	0.00	0.00	0.00	0.00	0.31	0.00	0.31
Sat Flow, veh/h	0	3685	34	1774	3539	1583		0		3548	0	1583
Grp Volume(v), veh/h	0	362	380	96	684	0		0.0		99	0	59
Grp Sat Flow(s),veh/h/ln	0	1770	1857	1774	1770	1583				1774	0	1583
Q Serve(g_s), s	0.0	8.5	8.5	2.6	5.7	0.0				1.0	0.0	1.4
Cycle Q Clear(g_c), s	0.0	8.5	8.5	2.6	5.7	0.0				1.0	0.0	1.4
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	625	655	174	1874	838				1113	0	497
V/C Ratio(X)	0.00	0.58	0.58	0.55	0.37	0.00				0.09	0.00	0.12
Avail Cap(c_a), veh/h	0	625	655	174	1874	838				1113	0	497
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.4	13.4	21.9	7.0	0.0				12.4	0.0	12.5
Incr Delay (d2), s/veh	0.0	3.9	3.7	12.0	0.6	0.0				0.2	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.8	5.0	1.9	2.9	0.0				0.5	0.0	0.7
LnGrp Delay(d),s/veh	0.0	17.3	17.1	34.0	7.6	0.0				12.5	0.0	13.0
LnGrp LOS		B	B	C	A					B		B
Approach Vol, veh/h		742			780						158	
Approach Delay, s/veh		17.2			10.8						12.7	
Approach LOS		B			B						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			9.0	22.0		20.0		31.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			5.0	18.0		16.0		27.0
Max Q Clear Time (g_c+I1), s			4.6	10.5		3.4		7.7
Green Ext Time (p_c), s			0.0	2.7		0.4		4.6

Intersection Summary	
HCM 2010 Ctrl Delay	13.8
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	169	647	9	27	950	290	8	2	15	284	6	69
Future Volume (veh/h)	169	647	9	27	950	290	8	2	15	284	6	69
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1900	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	184	703	10	29	1033	315	9	2	16	196	166	75
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	177	1161	17	111	1018	455	311	69	336	355	243	110
Arrive On Green	0.10	0.32	0.32	0.13	0.57	0.57	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1774	3573	51	1774	3539	1583	1464	325	1583	1774	1216	550
Grp Volume(v), veh/h	184	348	365	29	1033	315	11	0	16	196	0	241
Grp Sat Flow(s),veh/h/ln	1774	1770	1854	1774	1770	1583	1790	0	1583	1774	0	1766
Q Serve(g_s), s	8.0	13.2	13.2	1.2	23.0	11.2	0.4	0.0	0.6	7.9	0.0	10.1
Cycle Q Clear(g_c), s	8.0	13.2	13.2	1.2	23.0	11.2	0.4	0.0	0.6	7.9	0.0	10.1
Prop In Lane	1.00		0.03	1.00		1.00	0.82		1.00	1.00		0.31
Lane Grp Cap(c), veh/h	177	575	602	111	1018	455	380	0	336	355	0	353
V/C Ratio(X)	1.04	0.61	0.61	0.26	1.02	0.69	0.03	0.00	0.05	0.55	0.00	0.68
Avail Cap(c_a), veh/h	177	575	602	111	1018	455	380	0	336	355	0	353
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	22.7	22.7	33.3	17.0	14.5	25.0	0.0	25.1	28.8	0.0	29.6
Incr Delay (d2), s/veh	77.7	4.7	4.5	5.7	32.1	8.4	0.1	0.0	0.3	6.1	0.0	10.2
Initial Q Delay(d3),s/veh	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	7.1	7.4	0.8	15.3	5.8	0.2	0.0	0.3	4.5	0.0	5.9
LnGrp Delay(d),s/veh	113.8	27.4	27.2	39.0	49.1	22.9	25.1	0.0	25.3	34.9	0.0	39.9
LnGrp LOS	F	C	C	D	F	C	C		C	C		D
Approach Vol, veh/h		897			1377			27			437	
Approach Delay, s/veh		45.0			42.9			25.2			37.6	
Approach LOS		D			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	30.0		20.0	12.0	27.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	26.0		16.0	8.0	23.0
Max Q Clear Time (g_c+I1), s		2.6	3.2	15.2		12.1	10.0	25.0
Green Ext Time (p_c), s		0.0	0.0	3.3		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	42.6
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	832	275	86	733	183	350	97	138	433	235	382
Future Volume (veh/h)	60	832	275	86	733	183	350	97	138	433	235	382
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	65	904	299	93	797	199	242	297	150	363	406	415
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	118	872	288	99	1140	510	375	393	334	394	414	352
Arrive On Green	0.07	0.33	0.33	0.06	0.32	0.32	0.21	0.21	0.21	0.22	0.22	0.22
Sat Flow, veh/h	1774	2617	863	1774	3539	1583	1774	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	65	610	593	93	797	199	242	297	150	363	406	415
Grp Sat Flow(s),veh/h/ln	1774	1770	1710	1774	1770	1583	1774	1863	1583	1774	1863	1583
Q Serve(g_s), s	3.2	30.0	30.0	4.7	17.7	8.8	11.2	13.5	7.4	18.0	19.5	20.0
Cycle Q Clear(g_c), s	3.2	30.0	30.0	4.7	17.7	8.8	11.2	13.5	7.4	18.0	19.5	20.0
Prop In Lane	1.00		0.50	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	118	590	570	99	1140	510	375	393	334	394	414	352
V/C Ratio(X)	0.55	1.03	1.04	0.94	0.70	0.39	0.65	0.76	0.45	0.92	0.98	1.18
Avail Cap(c_a), veh/h	118	590	570	99	1140	510	375	393	334	394	414	352
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.7	30.0	30.0	42.4	26.7	23.6	32.4	33.3	30.9	34.2	34.8	35.0
Incr Delay (d2), s/veh	17.1	46.3	48.3	76.3	3.6	2.2	8.3	12.7	4.3	29.2	39.7	106.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	22.2	21.7	4.4	9.2	4.1	6.4	8.3	3.7	12.0	14.6	19.1
LnGrp Delay(d),s/veh	57.8	76.3	78.3	118.6	30.2	25.9	40.8	46.0	35.2	63.4	74.5	141.3
LnGrp LOS	E	F	F	F	C	C	D	D	D	E	E	F
Approach Vol, veh/h		1268			1089			689			1184	
Approach Delay, s/veh		76.3			37.0			41.8			94.5	
Approach LOS		E			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		23.0	9.0	34.0		24.0	10.0	33.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		19.0	5.0	30.0		20.0	6.0	29.0
Max Q Clear Time (g_c+I1), s		15.5	6.7	32.0		22.0	5.2	19.7
Green Ext Time (p_c), s		1.1	0.0	0.0		0.0	0.0	4.2

Intersection Summary	
HCM 2010 Ctrl Delay	65.7
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	79	6	7	86	9	4	3	8	0	0	0
Future Vol, veh/h	23	79	6	7	86	9	4	3	8	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	86	7	8	93	10	4	3	9	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	7.6	7.2
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	27%	21%	7%
Vol Thru, %	20%	73%	84%
Vol Right, %	53%	6%	9%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	15	108	102
LT Vol	4	23	7
Through Vol	3	79	86
RT Vol	8	6	9
Lane Flow Rate	16	117	111
Geometry Grp	1	1	1
Degree of Util (X)	0.018	0.132	0.123
Departure Headway (Hd)	4.056	4.054	4.01
Convergence, Y/N	Yes	Yes	Yes
Cap	867	884	893
Service Time	2.153	2.082	2.041
HCM Lane V/C Ratio	0.018	0.132	0.124
HCM Control Delay	7.2	7.7	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.4

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	193	54	31	35	0	0	0	0	28	0	45
Future Vol, veh/h	0	193	54	31	35	0	0	0	0	28	0	45
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	210	59	34	38	0	0	0	0	30	0	49

Major/Minor	Major1			Major2						Minor2		
Conflicting Flow All	-	0	0	210	0	0				316	316	38
Stage 1	-	-	-	-	-	-				106	106	-
Stage 2	-	-	-	-	-	-				210	210	-
Critical Hdwy	-	-	-	4.12	-	-				6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-				5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-				5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-				3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1361	-	0				677	600	1034
Stage 1	0	-	-	-	-	0				918	807	-
Stage 2	0	-	-	-	-	0				825	728	-
Platoon blocked, %		-	-		-							
Mov Cap-1 Maneuver	-	-	-	1361	-	-				659	0	1034
Mov Cap-2 Maneuver	-	-	-	-	-	-				659	0	-
Stage 1	-	-	-	-	-	-				894	0	-
Stage 2	-	-	-	-	-	-				825	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	3.6	9.5
HCM LOS			A

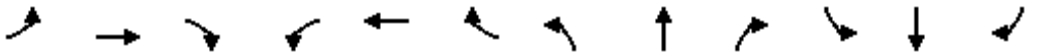
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1361	-	659	1034
HCM Lane V/C Ratio	-	-	0.025	-	0.046	0.047
HCM Control Delay (s)	-	-	7.7	0	10.7	8.7
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	869	127	928	1501	52	1417
Future Volume (veh/h)	869	127	928	1501	52	1417
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	945	0	1009	1632	57	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1126	504	1158	1287	419	659
Arrive On Green	0.32	0.00	0.34	0.69	0.24	0.00
Sat Flow, veh/h	3632	1583	3442	1863	1774	2787
Grp Volume(v), veh/h	945	0	1009	1632	57	0
Grp Sat Flow(s),veh/h/ln	1770	1583	1721	1863	1774	1393
Q Serve(g_s), s	27.3	0.0	30.3	76.0	2.8	0.0
Cycle Q Clear(g_c), s	27.3	0.0	30.3	76.0	2.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1126	504	1158	1287	419	659
V/C Ratio(X)	0.84	0.00	0.87	1.27	0.14	0.00
Avail Cap(c_a), veh/h	1126	504	1158	1287	419	659
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	34.9	0.0	34.3	17.0	33.1	0.0
Incr Delay (d2), s/veh	7.6	0.0	9.1	126.9	0.7	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.4	0.0	15.8	83.6	1.4	0.0
LnGrp Delay(d),s/veh	42.4	0.0	43.4	143.9	33.8	0.0
LnGrp LOS	D		D	F	C	
Approach Vol, veh/h	945			2641	57	
Approach Delay, s/veh	42.4			105.5	33.8	
Approach LOS	D			F	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		30.0	41.0	39.0				80.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		26.0	37.0	35.0				76.0
Max Q Clear Time (g_c+I1), s		4.8	32.3	29.3				78.0
Green Ext Time (p_c), s		0.1	1.9	3.0				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	88.0
HCM 2010 LOS	F

Appendix J.1 – Analysis Output Sheets (Future with Project)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	81	61	93	301	570	169	18	141	83	23	70
Future Volume (vph)	90	81	61	93	301	570	169	18	141	83	23	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3143	1441		1782	1583		1793	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3143	1441		1782	1583		1793	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	88	66	101	327	620	184	20	153	90	25	76
RTOR Reduction (vph)	0	0	58	0	229	256	0	0	91	0	0	58
Lane Group Flow (vph)	98	88	8	101	408	54	0	204	62	0	115	18
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Effective Green, g (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Actuated g/C Ratio	0.07	0.11	0.11	0.11	0.17	0.17		0.29	0.29		0.23	0.23
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	132	212	180	199	546	250		518	460		419	369
v/s Ratio Prot	c0.06	0.05		c0.06	c0.13			c0.11			c0.06	
v/s Ratio Perm			0.00			0.04			0.04			0.01
v/c Ratio	0.74	0.42	0.04	0.51	0.75	0.22		0.39	0.13		0.27	0.05
Uniform Delay, d1	33.4	30.3	29.0	30.7	28.9	26.1		20.9	19.3		23.1	21.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	20.0	0.5	0.0	2.0	4.9	0.2		2.2	0.6		1.6	0.2
Delay (s)	53.3	30.8	29.1	32.8	33.7	26.2		23.1	19.9		24.7	22.1
Level of Service	D	C	C	C	C	C		C	B		C	C
Approach Delay (s)		39.1			31.4			21.7			23.7	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	18.3
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	413	0	377	0	0	176	469	0	120	164	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	0	0	458	0	410	0	0	195	520	0	133	182	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		0		0	458	410		195	520	133	182	
Entry Volume veh/h		0		0	449	410		191	510	130	178	
Circulating Flow (Vc), pc/h	773			195			133			458		
Exiting Flow (Vex), pc/h	133			0			195			640		
Capacity (cPCE), pc/h		522		976	986			1030		802	820	
Capacity (c), veh/h		511		957	967			1009		786	804	
v/c Ratio (X)		0.00		0.00	0.46			0.19		0.17	0.22	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.0		3.8	9.2	0.0		5.3	0.0	6.3	6.9	
Lane LOS		A		A	A	A		A	A	A	A	
95% Queue		0.0		0.0	2.5			0.7		0.6	0.8	
Approach Delay, s/veh				4.8			1.5			6.6		
Approach LOS				A			A			A		
Intersection Delay, s/veh / LOS	3.9						A					

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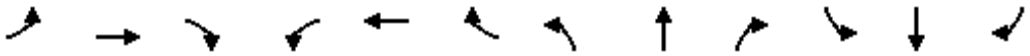

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	22	4	43	28	84	12	56	62	125	77	6
Future Volume (vph)	2	22	4	43	28	84	12	56	62	125	77	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	24	4	47	30	91	13	61	67	136	84	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	30	168	141	227
Volume Left (vph)	2	47	13	136
Volume Right (vph)	4	91	67	7
Hadj (s)	-0.03	-0.24	-0.23	0.14
Departure Headway (s)	5.0	4.6	4.4	4.7
Degree Utilization, x	0.04	0.21	0.17	0.30
Capacity (veh/h)	652	727	766	731
Control Delay (s)	8.2	8.8	8.4	9.6
Approach Delay (s)	8.2	8.8	8.4	9.6
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	40.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Surfrider Way
E/W Street Name	Surfrider Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1
Lane Assignment			LTR				LTR				LTR		LT		R	
Volume (V), veh/h	0	173	17	47	0	9	33	67	0	44	287	20	0	26	394	99
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	192	19	52	0	10	37	74	0	49	318	22	0	29	437	110
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929		5.1929	5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		263			121			389		466	110	
Entry Volume veh/h		258			119			381		457	108	
Circulating Flow (Vc), pc/h	476			559			240			96		
Exiting Flow (Vex), pc/h	70			196			584			499		
Capacity (cPCE), pc/h		702			646			889		1027	1027	
Capacity (c), veh/h		688			633			871		1006	1006	
v/c Ratio (X)		0.37			0.19			0.44		0.45	0.11	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		10.2			7.9			9.5		8.8	4.5	
Lane LOS		B			A			A		A	A	
95% Queue		1.7			0.7			2.3		2.4	0.4	
Approach Delay, s/veh	10.2			7.9			9.5			8.0		
Approach LOS	B			A			A			A		
Intersection Delay, s/veh / LOS	8.8						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	13	10	9	0	23	14	22	0	7	281	28	0	63	334	13
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	14	11	10	0	26	16	24	0	8	312	31	0	70	370	14
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		35			66			351			454	
Entry Volume veh/h		34			65			344			445	
Circulating Flow (Vc), pc/h		466			334			95			50	
Exiting Flow (Vex), pc/h		112			38			350			406	
Capacity (cPCE), pc/h		709			809			1028			1075	
Capacity (c), veh/h		695			793			1007			1054	
v/c Ratio (X)		0.05			0.08			0.34			0.42	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.7			5.3			7.1			8.0	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.3			1.5			2.1	
Approach Delay, s/veh	5.7			5.3			7.1			8.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	7.4						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/12/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	7	11	11	0	12	17	18	0	8	326	13	0	13	284	22
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	8	12	12	0	13	19	20	0	9	361	14	0	14	315	24
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		32			52			384			353	
Entry Volume veh/h		31			51			376			346	
Circulating Flow (Vc), pc/h		342			378			34			41	
Exiting Flow (Vex), pc/h		40			52			389			340	
Capacity (cPCE), pc/h		803			774			1092			1085	
Capacity (c), veh/h		787			759			1071			1063	
v/c Ratio (X)		0.04			0.07			0.35			0.33	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.0			5.4			6.9			6.6	
Lane LOS		A			A			A			A	
95% Queue		0.1			0.2			1.6			1.4	
Approach Delay, s/veh	5.0			5.4			6.9			6.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.6						A					

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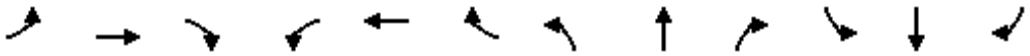


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	3	19	9	5	4	86	216	3	5	148	7
Future Volume (vph)	2	3	19	9	5	4	86	216	3	5	148	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	3	21	10	5	4	93	235	3	5	161	8

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	5	21	19	211	121	86	89
Volume Left (vph)	2	0	10	93	0	5	0
Volume Right (vph)	0	21	4	0	3	0	8
Hadj (s)	0.23	-0.67	0.01	0.25	0.02	0.06	-0.03
Departure Headway (s)	5.9	5.0	5.6	5.0	4.8	5.0	4.9
Degree Utilization, x	0.01	0.03	0.03	0.29	0.16	0.12	0.12
Capacity (veh/h)	563	660	588	705	737	704	720
Control Delay (s)	7.7	6.9	8.8	8.9	7.5	7.4	7.3
Approach Delay (s)	7.1		8.8	8.4		7.4	
Approach LOS	A		A	A		A	

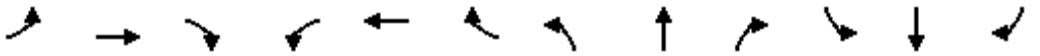
Intersection Summary				
Delay	8.0			
Level of Service	A			
Intersection Capacity Utilization	30.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	129	57	126	91	33	111
Future Volume (vph)	129	57	126	91	33	111
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	140	62	137	99	36	121

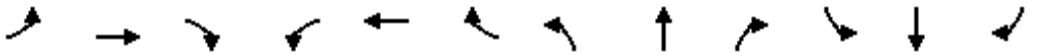
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	140	62	236	157
Volume Left (vph)	140	0	0	36
Volume Right (vph)	0	62	99	0
Hadj (s)	0.53	-0.67	-0.22	0.08
Departure Headway (s)	6.0	4.8	4.4	4.8
Degree Utilization, x	0.23	0.08	0.29	0.21
Capacity (veh/h)	569	708	776	708
Control Delay (s)	9.5	7.0	9.3	9.1
Approach Delay (s)	8.8		9.3	9.1
Approach LOS	A		A	A

Intersection Summary			
Delay	9.0		
Level of Service	A		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		



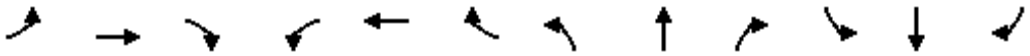
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	132	38	169	33	0	0	0	0	31	41
Future Volume (vph)	18	0	132	38	169	33	0	0	0	0	31	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.98						0.91	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3452						3237	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3452						3237	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	0	143	41	184	36	0	0	0	0	34	45
RTOR Reduction (vph)	0	0	130	16	14	0	0	0	0	0	42	0
Lane Group Flow (vph)	20	0	13	25	206	0	0	0	0	0	37	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	5.3		5.3	37.1	37.1						4.1	
Effective Green, g (s)	5.3		5.3	37.1	37.1						4.1	
Actuated g/C Ratio	0.09		0.09	0.62	0.62						0.07	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	156		246	1094	2134						221	
v/s Ratio Prot	c0.01		0.00	0.01	c0.06						c0.01	
v/s Ratio Perm												
v/c Ratio	0.13		0.05	0.02	0.10						0.17	
Uniform Delay, d1	25.2		25.0	4.4	4.6						26.3	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.4		0.1	0.0	0.1						0.4	
Delay (s)	25.6		25.1	4.5	4.7						26.7	
Level of Service	C		C	A	A						C	
Approach Delay (s)		25.2			4.7			0.0			26.7	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	144	213	73	67	585	0	0	333	30
Future Volume (vph)	0	0	0	144	213	73	67	585	0	0	333	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1525	1770	1863			1767	1460
Flt Permitted				0.95	1.00	1.00	0.37	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1525	686	1863			1767	1460
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	157	232	79	73	636	0	0	362	33
RTOR Reduction (vph)	0	0	0	0	0	55	0	0	0	0	1	22
Lane Group Flow (vph)	0	0	0	157	232	24	73	636	0	0	364	8
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.1	18.1	18.1	32.7	32.7			17.1	17.1
Effective Green, g (s)				18.1	18.1	18.1	32.7	32.7			17.1	17.1
Actuated g/C Ratio				0.30	0.30	0.30	0.54	0.54			0.28	0.28
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				526	1053	453	557	1001			496	410
v/s Ratio Prot				c0.09	0.07		0.02	c0.34			c0.21	
v/s Ratio Perm						0.02	0.05					0.01
v/c Ratio				0.30	0.22	0.05	0.13	0.64			0.73	0.02
Uniform Delay, d1				16.5	16.0	15.2	10.8	9.9			19.8	15.8
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				1.4	0.5	0.2	0.1	1.5			5.9	0.0
Delay (s)				17.9	16.5	15.4	11.0	11.4			25.7	15.8
Level of Service				B	B	B	B	B			C	B
Approach Delay (s)		0.0			16.8			11.3			25.0	
Approach LOS		A			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	115	1	124	433	199	11	24	188	134	47	6
Future Volume (vph)	23	115	1	124	433	199	11	24	188	134	47	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3535		1770	3539	1583		1834	1583	1681	1714	
Flt Permitted	0.42	1.00		0.67	1.00	1.00		0.94	1.00	0.73	0.90	
Satd. Flow (perm)	779	3535		1252	3539	1583		1754	1583	1296	1572	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	125	1	135	471	216	12	26	204	146	51	7
RTOR Reduction (vph)	0	1	0	0	0	160	0	0	85	0	3	0
Lane Group Flow (vph)	25	125	0	135	471	56	0	38	119	101	100	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	15.9	15.9		15.5	15.5	15.5		34.9	34.9	34.9	34.9	
Effective Green, g (s)	15.9	15.9		15.5	15.5	15.5		34.9	34.9	34.9	34.9	
Actuated g/C Ratio	0.27	0.27		0.26	0.26	0.26		0.58	0.58	0.58	0.58	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	206	936		323	914	408		1020	920	753	914	
v/s Ratio Prot		0.04			c0.13							
v/s Ratio Perm	0.03			0.11		0.04		0.02	0.07	c0.08	0.06	
v/c Ratio	0.12	0.13		0.42	0.52	0.14		0.04	0.13	0.13	0.11	
Uniform Delay, d1	16.7	16.8		18.5	19.0	17.1		5.4	5.7	5.7	5.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.1		1.0	0.6	0.2		0.1	0.3	0.4	0.2	
Delay (s)	17.1	16.9		19.5	19.6	17.3		5.4	6.0	6.1	5.8	
Level of Service	B	B		B	B	B		A	A	A	A	
Approach Delay (s)		16.9			19.0			5.9			6.0	
Approach LOS		B			B			A			A	

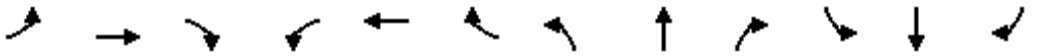
Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	89	6	21	31	6	8
Future Volume (Veh/h)	89	6	21	31	6	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	7	23	34	7	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			104		180	100
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			104		180	100
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	99
cM capacity (veh/h)			1488		796	955

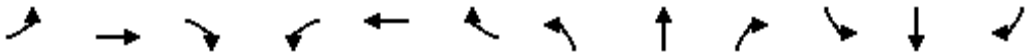
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	104	57	16
Volume Left	0	23	7
Volume Right	7	0	9
cSH	1700	1488	878
Volume to Capacity	0.06	0.02	0.02
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	3.1	9.2
Lane LOS		A	A
Approach Delay (s)	0.0	3.1	9.2
Approach LOS			A

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	19.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	55	96	0	0	0	27	222	64	75	215	53
Future Volume (vph)	89	55	96	0	0	0	27	222	64	75	215	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.94				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1494				1770	1863	1551	1770	1863	1515
Flt Permitted	0.95	1.00	1.00				0.61	1.00	1.00	0.42	1.00	1.00
Satd. Flow (perm)	1770	1863	1494				1142	1863	1551	783	1863	1515
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	60	104	0	0	0	29	241	70	82	234	58
RTOR Reduction (vph)	0	0	55	0	0	0	0	0	51	0	0	36
Lane Group Flow (vph)	97	60	49	0	0	0	29	241	19	82	234	22
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	28.0	28.0	28.0				16.0	16.0	16.0	23.2	23.2	23.2
Effective Green, g (s)	28.0	28.0	28.0				16.0	16.0	16.0	23.2	23.2	23.2
Actuated g/C Ratio	0.47	0.47	0.47				0.27	0.27	0.27	0.39	0.39	0.39
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	826	869	697				304	496	413	355	720	585
v/s Ratio Prot	c0.05	0.03						c0.13		0.01	c0.13	
v/s Ratio Perm			0.03				0.03		0.01	0.08		0.01
v/c Ratio	0.12	0.07	0.07				0.10	0.49	0.05	0.23	0.33	0.04
Uniform Delay, d1	9.0	8.8	8.8				16.6	18.5	16.3	12.2	12.9	11.5
Progression Factor	1.00	1.00	1.00				0.71	0.70	0.27	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	0.2				0.6	3.4	0.2	0.3	1.2	0.1
Delay (s)	9.3	9.0	9.0				12.4	16.3	4.6	12.5	14.1	11.6
Level of Service	A	A	A				B	B	A	B	B	B
Approach Delay (s)		9.1			0.0			13.6			13.4	
Approach LOS		A			A			B			B	

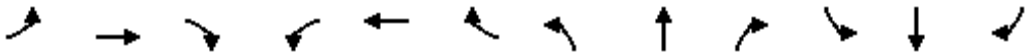
Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	209	10	0	0	0	0	4	17	20	7	0
Future Volume (Veh/h)	10	209	10	0	0	0	0	4	17	20	7	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	227	11	0	0	0	0	4	18	22	8	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			238			258	254	119	156	260	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			238			258	254	119	156	260	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	98	97	99	100
cM capacity (veh/h)	1622			1326			664	644	910	773	639	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	124	124	22	30
Volume Left	11	0	0	22
Volume Right	0	11	18	0
cSH	1622	1700	846	732
Volume to Capacity	0.01	0.07	0.03	0.04
Queue Length 95th (ft)	1	0	2	3
Control Delay (s)	0.7	0.0	9.4	10.1
Lane LOS	A		A	B
Approach Delay (s)	0.3		9.4	10.1
Approach LOS			A	B

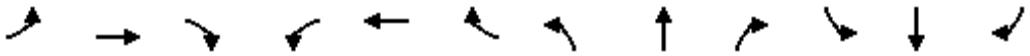
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	21.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	24	473	5	0	0	0	0	4	21	14	12	0
Future Volume (vph)	24	473	5	0	0	0	0	4	21	14	12	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	514	5	0	0	0	0	4	23	15	13	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	283	262	27	28
Volume Left (vph)	26	0	0	15
Volume Right (vph)	0	5	23	0
Hadj (s)	0.08	0.02	-0.48	0.14
Departure Headway (s)	4.7	4.7	4.6	5.2
Degree Utilization, x	0.37	0.34	0.03	0.04
Capacity (veh/h)	755	761	730	643
Control Delay (s)	9.3	8.8	7.7	8.4
Approach Delay (s)	9.1		7.7	8.4
Approach LOS	A		A	A

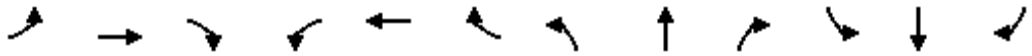
Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	28.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	97	187	9	40	0	97	0	47	29	0	0	0
Future Volume (vph)	97	187	9	40	0	97	0	47	29	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	105	203	10	43	0	105	0	51	32	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	105	213	148	83
Volume Left (vph)	105	0	43	0
Volume Right (vph)	0	10	105	32
Hadj (s)	0.53	0.00	-0.33	-0.20
Departure Headway (s)	5.4	4.8	4.2	4.7
Degree Utilization, x	0.16	0.29	0.17	0.11
Capacity (veh/h)	660	730	821	703
Control Delay (s)	8.1	8.5	8.1	8.3
Approach Delay (s)	8.4		8.1	8.3
Approach LOS	A		A	A

Intersection Summary				
Delay	8.3			
Level of Service	A			
Intersection Capacity Utilization	32.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	14	0	0	51	14	224	32	23	232	6
Future Volume (Veh/h)	0	0	14	0	0	51	14	224	32	23	232	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	15	0	0	55	15	243	35	25	252	7
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked												
vC, conflicting volume	640	628	262	614	614	268	266			285		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	640	628	262	614	614	268	266			285		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	93	99			98		
cM capacity (veh/h)	346	382	772	380	389	765	1290			1267		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	15	55	15	278	25	259
Volume Left	0	0	15	0	25	0
Volume Right	15	55	0	35	0	7
cSH	772	765	1290	1700	1267	1700
Volume to Capacity	0.02	0.07	0.01	0.16	0.02	0.15
Queue Length 95th (ft)	1	6	1	0	2	0
Control Delay (s)	9.8	10.1	7.8	0.0	7.9	0.0
Lane LOS	A	B	A		A	
Approach Delay (s)	9.8	10.1	0.4		0.7	
Approach LOS	A	B				

Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	23.8%	ICU Level of Service		A
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	2	25	0	59	9	4	0	18	226	11	0	3	235	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	16	2	28	0	65	10	4	0	20	251	12	0	3	261	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		46			79			283			284	
Entry Volume veh/h		45			77			277			278	
Circulating Flow (Vc), pc/h	329			287			21			95		
Exiting Flow (Vex), pc/h	17			50			271			354		
Capacity (cPCE), pc/h		813			848			1107			1028	
Capacity (c), veh/h		797			831			1085			1007	
v/c Ratio (X)		0.06			0.09			0.26			0.28	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.1			5.2			5.7			6.3	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.3			1.0			1.1	
Approach Delay, s/veh	5.1			5.2			5.7			6.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	5.9						A					

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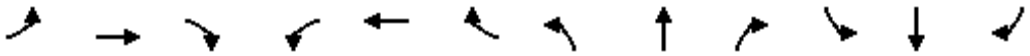
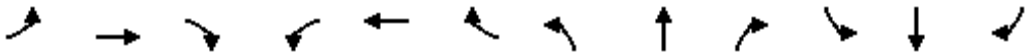


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	30	16	25	4	79	3	136	39	93	93	1
Future Volume (vph)	20	30	16	25	4	79	3	136	39	93	93	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	33	17	27	4	86	3	148	42	101	101	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	72	117	193	203
Volume Left (vph)	22	27	3	101
Volume Right (vph)	17	86	42	1
Hadj (s)	-0.05	-0.36	-0.09	0.13
Departure Headway (s)	5.0	4.6	4.5	4.7
Degree Utilization, x	0.10	0.15	0.24	0.27
Capacity (veh/h)	657	713	756	722
Control Delay (s)	8.5	8.4	9.0	9.4
Approach Delay (s)	8.5	8.4	9.0	9.4
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	37.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	202	22	4	93	15	11	23	27	20	32	11
Future Volume (Veh/h)	8	202	22	4	93	15	11	23	27	20	32	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	220	24	4	101	16	12	25	29	22	35	12
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	131			251			404	396	239	422	400	124
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	131			251			404	396	239	422	400	124
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			98	95	96	95	93	99
cM capacity (veh/h)	1437			1307			507	527	795	487	524	915

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	253	121	66	69
Volume Left	9	4	12	22
Volume Right	24	16	29	12
cSH	1437	1307	613	552
Volume to Capacity	0.01	0.00	0.11	0.13
Queue Length 95th (ft)	0	0	9	11
Control Delay (s)	0.3	0.3	11.6	12.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	11.6	12.5
Approach LOS			B	B

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	28.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCS 2010 Roundabout Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Wisconsin Avenue
Agency or Co.	IBI Group	E/W Street Name	Wisconsin Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Period	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	51	56	131	0	93	30	29	0	64	234	67	0	18	257	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	57	62	145	0	103	33	32	0	71	259	74	0	20	285	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		264			168			404			324	
Entry Volume veh/h		259			165			396			318	
Circulating Flow (Vc), pc/h		408			387			139			207	
Exiting Flow (Vex), pc/h		156			123			348			533	
Capacity (cPCE), pc/h		751			767			983			919	
Capacity (c), veh/h		737			752			964			901	
v/c Ratio (X)		0.35			0.22			0.41			0.35	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.3			7.2			8.4			7.9	
Lane LOS		A			A			A			A	
95% Queue		1.6			0.8			2.0			1.6	
Approach Delay, s/veh	9.3			7.2			8.4			7.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	8.3						A					

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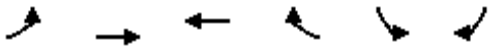
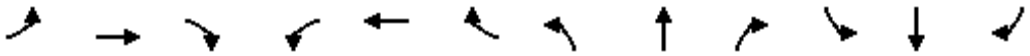


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	221	214	5	17	15
Future Volume (Veh/h)	9	221	214	5	17	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	240	233	5	18	16
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	246				504	244
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	246				504	244
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	98
cM capacity (veh/h)	1311				519	788

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	250	238	34
Volume Left	10	0	18
Volume Right	0	5	16
cSH	1311	1700	619
Volume to Capacity	0.01	0.14	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.4	0.0	11.2
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	11.2
Approach LOS			B

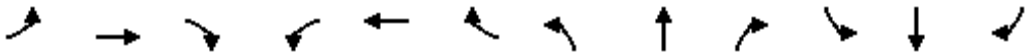
Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		29.3%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	206	9	20	195	11	6	5	14	36	1	6
Future Volume (Veh/h)	7	206	9	20	195	11	6	5	14	36	1	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	224	10	22	212	12	7	5	15	39	1	7
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	226			234			516	515	229	526	514	222
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	226			234			516	515	229	526	514	222
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			98	99	98	91	100	99
cM capacity (veh/h)	1340			1333			455	452	810	441	453	815

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	242	246	27	47
Volume Left	8	22	7	39
Volume Right	10	12	15	7
cSH	1340	1333	601	473
Volume to Capacity	0.01	0.02	0.04	0.10
Queue Length 95th (ft)	0	1	4	8
Control Delay (s)	0.3	0.8	11.3	13.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	11.3	13.4
Approach LOS			B	B

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	33.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	114	188	71	144	0	101	0	36	0	0	0
Future Volume (vph)	0	114	188	71	144	0	101	0	36	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	124	204	77	157	0	110	0	39	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	328	234	149	0
Volume Left (vph)	0	77	110	0
Volume Right (vph)	204	0	39	0
Hadj (s)	-0.34	0.10	0.02	0.00
Departure Headway (s)	4.3	4.8	5.2	5.4
Degree Utilization, x	0.39	0.31	0.21	0.00
Capacity (veh/h)	815	720	634	900
Control Delay (s)	9.9	9.9	9.6	8.4
Approach Delay (s)	9.9	9.9	9.6	0.0
Approach LOS	A	A	A	A

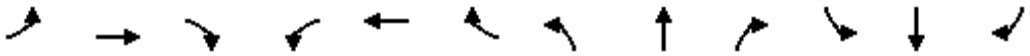
Intersection Summary				
Delay	9.8			
Level of Service	A			
Intersection Capacity Utilization	51.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	48	67	85	30	78	102
Future Volume (vph)	48	67	85	30	78	102
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	73	92	33	85	111

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	125	125	196
Volume Left (vph)	52	0	85
Volume Right (vph)	73	33	0
Hadj (s)	-0.23	-0.12	0.12
Departure Headway (s)	4.4	4.3	4.5
Degree Utilization, x	0.15	0.15	0.24
Capacity (veh/h)	760	803	776
Control Delay (s)	8.2	8.0	8.9
Approach Delay (s)	8.2	8.0	8.9
Approach LOS	A	A	A

Intersection Summary			
Delay	8.4		
Level of Service	A		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	246	1	6	198	36	7	9	12	36	15	9
Future Volume (Veh/h)	7	246	1	6	198	36	7	9	12	36	15	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	267	1	7	215	39	8	10	13	39	16	10
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.93						0.93	0.93		0.93	0.93	0.93
vC, conflicting volume	257			279			565	566	286	561	546	242
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	168			279			498	499	286	494	478	152
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	98	98	91	96	99
cM capacity (veh/h)	1312			1272			420	432	741	426	443	830

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	276	261	31	65
Volume Left	8	7	8	39
Volume Right	1	39	13	10
cSH	1312	1272	519	465
Volume to Capacity	0.01	0.01	0.06	0.14
Queue Length 95th (ft)	0	0	5	12
Control Delay (s)	0.3	0.3	12.4	14.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	12.4	14.0
Approach LOS			B	B

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	30.9%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Oceanside Blvd
E/W Street Name	Oceanside Boulevard
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	22	139	78	0	108	141	98	0	40	202	57	0	107	256	16
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	24	154	86	0	120	156	109	0	44	224	63	0	119	284	18
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		264			385			331			421	
Entry Volume veh/h		259			377			325			413	
Circulating Flow (Vc), pc/h		523			292			297			320	
Exiting Flow (Vex), pc/h		336			218			357			490	
Capacity (cPCE), pc/h		670			844			840			821	
Capacity (c), veh/h		657			827			823			804	
v/c Ratio (X)		0.39			0.46			0.39			0.51	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		11.0			10.2			9.2			11.7	
Lane LOS		B			B			A			B	
95% Queue		1.9			2.4			1.9			3.0	
Approach Delay, s/veh	11.0			10.2			9.2			11.7		
Approach LOS	B			B			A			B		
Intersection Delay, s/veh / LOS	10.5						B					

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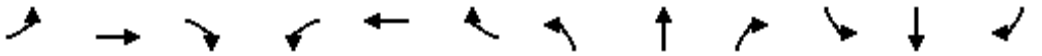

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	345	0	16	445	87	8	9	35	267	14	48
Future Volume (vph)	12	345	0	16	445	87	8	9	35	267	14	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3539		1755	3443			3125			1777	1524
Flt Permitted	0.30	1.00		0.49	1.00			0.92			0.69	1.00
Satd. Flow (perm)	557	3539		909	3443			2887			1290	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	375	0	17	484	95	9	10	38	290	15	52
RTOR Reduction (vph)	0	0	0	0	34	0	0	16	0	0	0	21
Lane Group Flow (vph)	13	375	0	17	545	0	0	41	0	0	305	31
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	15.0	15.0		15.0	15.0			35.5			35.5	35.5
Effective Green, g (s)	15.0	15.0		15.0	15.0			35.5			35.5	35.5
Actuated g/C Ratio	0.25	0.25		0.25	0.25			0.59			0.59	0.59
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	139	884		227	860			1708			763	901
v/s Ratio Prot		0.11			c0.16							
v/s Ratio Perm	0.02			0.02				0.01			c0.24	0.02
v/c Ratio	0.09	0.42		0.07	0.63			0.02			0.40	0.03
Uniform Delay, d1	17.3	18.9		17.2	20.1			5.1			6.6	5.1
Progression Factor	0.82	0.84		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.3	0.3		0.1	1.5			0.0			1.6	0.1
Delay (s)	14.4	16.1		17.3	21.6			5.1			8.1	5.2
Level of Service	B	B		B	C			A			A	A
Approach Delay (s)		16.0			21.5			5.1			7.7	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2035
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Morse Street
E/W Street Name	Morse Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	23	12	16	0	27	8	100	0	2	330	54	0	84	445	16
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	26	13	18	0	30	9	111	0	2	366	60	0	93	493	18
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		57			150			428			604	
Entry Volume veh/h		56			147			420			592	
Circulating Flow (Vc), pc/h	616			394			132			41		
Exiting Flow (Vex), pc/h	166			29			503			541		
Capacity (cPCE), pc/h		610			762			990			1085	
Capacity (c), veh/h		598			747			971			1063	
v/c Ratio (X)		0.09			0.20			0.43			0.56	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.1			7.0			8.7			10.3	
Lane LOS		A			A			A			B	
95% Queue		0.3			0.7			2.2			3.6	
Approach Delay, s/veh	7.1			7.0			8.7			10.3		
Approach LOS	A			A			A			B		
Intersection Delay, s/veh / LOS	9.2						A					

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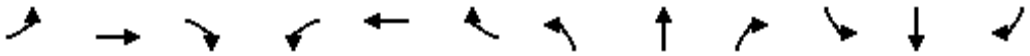
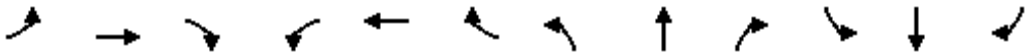


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	130	22	34	112	0	19	0	28	0	0	0
Future Volume (Veh/h)	0	130	22	34	112	0	19	0	28	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	141	24	37	122	0	21	0	30	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	122			165			349	349	153	379	361	122
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	122			165			349	349	153	379	361	122
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			96	100	97	100	100	100
cM capacity (veh/h)	1465			1413			594	560	893	548	551	929

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	165	159	51	0
Volume Left	0	37	21	0
Volume Right	24	0	30	0
cSH	1465	1413	739	1700
Volume to Capacity	0.00	0.03	0.07	0.00
Queue Length 95th (ft)	0	2	6	0
Control Delay (s)	0.0	1.9	10.2	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	1.9	10.2	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	29.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	63	10	2	45	1	17	0	7	1	0	1
Future Volume (Veh/h)	1	63	10	2	45	1	17	0	7	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	68	11	2	49	1	18	0	8	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	50			79			130	130	74	137	134	50
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	50			79			130	130	74	137	134	50
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	100	99	100	100	100
cM capacity (veh/h)	1557			1519			841	760	988	826	755	1019

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	80	52	26	2
Volume Left	1	2	18	1
Volume Right	11	1	8	1
cSH	1557	1519	881	912
Volume to Capacity	0.00	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	2	0
Control Delay (s)	0.1	0.3	9.2	9.0
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.3	9.2	9.0
Approach LOS			A	A

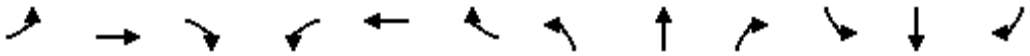
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	14.3%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	36	87	14	36	108	14
Future Volume (vph)	36	87	14	36	108	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	95	15	39	117	15

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	134	54	132
Volume Left (vph)	39	0	117
Volume Right (vph)	95	39	0
Hadj (s)	-0.33	-0.40	0.21
Departure Headway (s)	4.0	3.9	4.4
Degree Utilization, x	0.15	0.06	0.16
Capacity (veh/h)	864	870	783
Control Delay (s)	7.7	7.2	8.3
Approach Delay (s)	7.7	7.2	8.3
Approach LOS	A	A	A

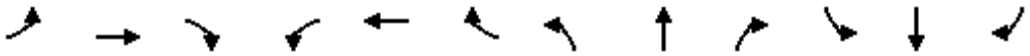
Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	101	76	12	67	3	57	8	12	12	9	4
Future Volume (Veh/h)	3	101	76	12	67	3	57	8	12	12	9	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	110	83	13	73	3	62	9	13	13	10	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	76			193			267	260	152	276	300	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	76			193			267	260	152	276	300	74
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			91	99	99	98	98	100
cM capacity (veh/h)	1523			1380			668	638	895	654	606	987

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	196	89	84	27
Volume Left	3	13	62	13
Volume Right	83	3	13	4
cSH	1523	1380	692	668
Volume to Capacity	0.00	0.01	0.12	0.04
Queue Length 95th (ft)	0	1	10	3
Control Delay (s)	0.1	1.2	10.9	10.6
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	1.2	10.9	10.6
Approach LOS			B	B

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	24.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	127	4	3	79	2	1	1	8	1	1	1
Future Volume (Veh/h)	0	127	4	3	79	2	1	1	8	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	138	4	3	86	2	1	1	9	1	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	88			142			234	234	140	242	235	87
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88			142			234	234	140	242	235	87
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	100	100	100
cM capacity (veh/h)	1508			1441			717	665	908	702	664	971

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	142	91	11	3
Volume Left	0	3	1	1
Volume Right	4	2	9	1
cSH	1508	1441	859	758
Volume to Capacity	0.00	0.00	0.01	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.0	0.3	9.2	9.8
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.3	9.2	9.8
Approach LOS			A	A

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	16.9%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2035
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Cassidy Street
E/W Street Name	Cassidy Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	44	127	82	0	55	59	27	0	103	304	51	0	63	333	20
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	49	141	91	0	61	65	30	0	114	337	57	0	70	369	22
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		281			156			508			461	
Entry Volume veh/h		275			153			498			452	
Circulating Flow (Vc), pc/h		500			500			260			240	
Exiting Flow (Vex), pc/h		268			201			416			521	
Capacity (cPCE), pc/h		685			685			871			889	
Capacity (c), veh/h		672			672			854			871	
v/c Ratio (X)		0.41			0.23			0.58			0.52	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		11.1			8.1			12.8			11.1	
Lane LOS		B			A			B			B	
95% Queue		2.0			0.9			3.9			3.1	
Approach Delay, s/veh	11.1			8.1			12.8			11.1		
Approach LOS	B			A			B			B		
Intersection Delay, s/veh / LOS	11.4						B					

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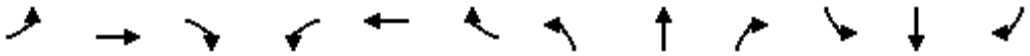
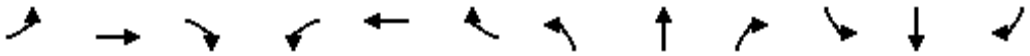


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	87	22	26	50	12	9	23	22	9	19	17
Future Volume (Veh/h)	15	87	22	26	50	12	9	23	22	9	19	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	95	24	28	54	13	10	25	24	10	21	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	67			119			284	262	107	292	268	60
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	67			119			284	262	107	292	268	60
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			98	96	97	98	97	98
cM capacity (veh/h)	1535			1469			625	624	947	610	620	1005

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	135	95	59	49
Volume Left	16	28	10	10
Volume Right	24	13	24	18
cSH	1535	1469	725	719
Volume to Capacity	0.01	0.02	0.08	0.07
Queue Length 95th (ft)	1	1	7	5
Control Delay (s)	0.9	2.3	10.4	10.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.9	2.3	10.4	10.4
Approach LOS			B	B

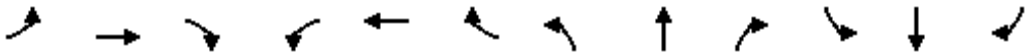
Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	20.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	51	6	4	31	1	5	8	8	4	4	2
Future Volume (vph)	2	51	6	4	31	1	5	8	8	4	4	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	55	7	4	34	1	5	9	9	4	4	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	64	39	23	10
Volume Left (vph)	2	4	5	4
Volume Right (vph)	7	1	9	2
Hadj (s)	-0.03	0.04	-0.16	-0.01
Departure Headway (s)	4.0	4.1	4.0	4.1
Degree Utilization, x	0.07	0.04	0.03	0.01
Capacity (veh/h)	889	871	873	844
Control Delay (s)	7.3	7.3	7.1	7.2
Approach Delay (s)	7.3	7.3	7.1	7.2
Approach LOS	A	A	A	A

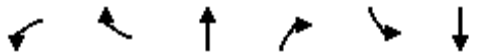
Intersection Summary				
Delay	7.2			
Level of Service	A			
Intersection Capacity Utilization	13.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	100	3	20	46	16	3	43	82	124	8	6
Future Volume (vph)	6	100	3	20	46	16	3	43	82	124	8	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	109	3	22	50	17	3	47	89	135	9	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	119	89	139	151
Volume Left (vph)	7	22	3	135
Volume Right (vph)	3	17	89	7
Hadj (s)	0.03	-0.03	-0.35	0.18
Departure Headway (s)	4.7	4.7	4.3	4.8
Degree Utilization, x	0.16	0.12	0.16	0.20
Capacity (veh/h)	707	707	796	714
Control Delay (s)	8.6	8.3	8.1	8.9
Approach Delay (s)	8.6	8.3	8.1	8.9
Approach LOS	A	A	A	A

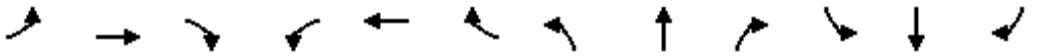
Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	36.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	45	27	11	50	54
Future Volume (vph)	0	45	27	11	50	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	49	29	12	54	59

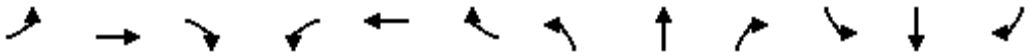
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	49	41	113
Volume Left (vph)	0	0	54
Volume Right (vph)	49	12	0
Hadj (s)	-0.57	-0.14	0.13
Departure Headway (s)	3.7	4.0	4.2
Degree Utilization, x	0.05	0.05	0.13
Capacity (veh/h)	938	881	850
Control Delay (s)	6.9	7.2	7.8
Approach Delay (s)	6.9	7.2	7.8
Approach LOS	A	A	A

Intersection Summary			
Delay	7.4		
Level of Service	A		
Intersection Capacity Utilization	15.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	116	38	231	47	195	28	198	110	166	279	6
Future Volume (vph)	15	116	38	231	47	195	28	198	110	166	279	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0	5.0	4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	1.00	0.96	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	2006	1863	1554		1788	1794	1770	2111	1527	2006	3998	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	2006	1863	1554		1788	1794	1770	2111	1527	2006	3998	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	126	41	251	51	212	30	215	120	180	303	7
RTOR Reduction (vph)	0	0	37	0	0	143	0	0	84	0	2	0
Lane Group Flow (vph)	16	126	4	0	302	69	30	215	36	180	308	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	6.4	6.4	6.4		15.5	22.2	1.3	20.6	20.6	6.7	26.0	
Effective Green, g (s)	6.4	6.4	6.4		15.5	22.2	1.3	20.6	20.6	6.7	26.0	
Actuated g/C Ratio	0.09	0.09	0.09		0.23	0.33	0.02	0.30	0.30	0.10	0.38	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0	5.0	4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	187	174	145		405	583	33	636	460	196	1521	
v/s Ratio Prot	0.01	c0.07			c0.17	0.04	0.02	c0.10		c0.09	0.08	
v/s Ratio Perm			0.00						0.02			
v/c Ratio	0.09	0.72	0.03		0.75	0.12	0.91	0.34	0.08	0.92	0.20	
Uniform Delay, d1	28.3	30.1	28.1		24.6	16.2	33.4	18.5	17.1	30.5	14.2	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	11.9	0.0		7.3	0.1	116.4	1.4	0.3	41.5	0.3	
Delay (s)	28.3	42.0	28.1		31.9	16.3	149.8	20.0	17.4	72.0	14.5	
Level of Service	C	D	C		C	B	F	B	B	E	B	
Approach Delay (s)		37.7			25.4			29.8			35.6	
Approach LOS		D			C			C			D	

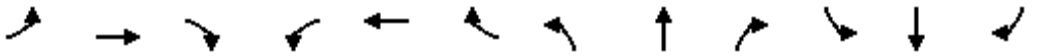
Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	68.3	Sum of lost time (s)	19.1
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	389	5	16	579	33	0	0	26	18	0	20
Future Volume (Veh/h)	5	389	5	16	579	33	0	0	26	18	0	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	423	5	17	629	36	0	0	28	20	0	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	665			428			1138	1134	426	1144	1119	647
vC1, stage 1 conf vol							436	436		681	681	
vC2, stage 2 conf vol							703	699		464	438	
vCu, unblocked vol	665			365			1117	1113	362	1124	1097	647
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			100	100	96	94	100	95
cM capacity (veh/h)	924			1127			353	376	645	363	382	471

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	433	682	28	42
Volume Left	5	17	0	20
Volume Right	5	36	28	22
cSH	924	1127	645	413
Volume to Capacity	0.01	0.02	0.04	0.10
Queue Length 95th (ft)	0	1	3	8
Control Delay (s)	0.2	0.4	10.8	14.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.4	10.8	14.7
Approach LOS			B	B

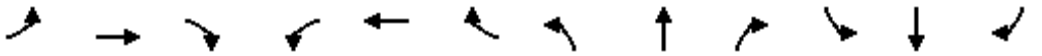
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	481	10	31	758	18	10	4	66	22	4	11
Future Volume (Veh/h)	7	481	10	31	758	18	10	4	66	22	4	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	523	11	34	824	20	11	4	72	24	4	12
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.99			0.99	0.99	0.99	0.99	0.99	
vC, conflicting volume	844			535			1452	1458	530	1515	1453	835
vC1, stage 1 conf vol							546	546		902	902	
vC2, stage 2 conf vol							907	912		613	551	
vCu, unblocked vol	844			523			1452	1457	517	1515	1452	835
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			96	99	87	90	99	97
cM capacity (veh/h)	792			1030			264	292	551	251	294	367

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	8	534	34	844	87	40
Volume Left	8	0	34	0	11	24
Volume Right	0	11	0	20	72	12
cSH	792	1700	1030	1700	468	282
Volume to Capacity	0.01	0.31	0.03	0.50	0.19	0.14
Queue Length 95th (ft)	1	0	3	0	17	12
Control Delay (s)	9.6	0.0	8.6	0.0	14.4	19.9
Lane LOS	A		A		B	C
Approach Delay (s)	0.1		0.3		14.4	19.9
Approach LOS					B	C

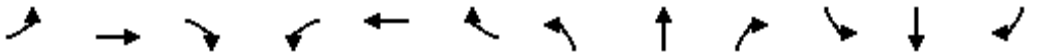
Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	54.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	650	0	0	838	106	0	0	0	0	0	18
Future Volume (Veh/h)	22	650	0	0	838	106	0	0	0	0	0	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	707	0	0	911	115	0	0	0	0	0	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1026			707			1686	1781	707	1724	1724	968
vC1, stage 1 conf vol							755	755		968	968	
vC2, stage 2 conf vol							931	1026		755	755	
vCu, unblocked vol	1026			707			1686	1781	707	1724	1724	968
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	100	100	94
cM capacity (veh/h)	677			891			227	240	435	242	263	308

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	24	707	0	1026	0	20
Volume Left	24	0	0	0	0	0
Volume Right	0	0	0	115	0	20
cSH	677	1700	1700	1700	1700	308
Volume to Capacity	0.04	0.42	0.00	0.60	0.00	0.06
Queue Length 95th (ft)	3	0	0	0	0	5
Control Delay (s)	10.5	0.0	0.0	0.0	0.0	17.5
Lane LOS	B				A	C
Approach Delay (s)	0.3		0.0		0.0	17.5
Approach LOS					A	C

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	60.5%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	67	0	0	58	28	270	23	41	612	10
Future Volume (Veh/h)	0	0	67	0	0	58	28	270	23	41	612	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	73	0	0	63	30	293	25	45	665	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1176	1138	670	1194	1132	306	676			318		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1176	1138	670	1194	1132	306	676			318		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	84	100	100	91	97			96		
cM capacity (veh/h)	146	188	457	130	189	734	915			1242		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	73	63	30	318	45	676
Volume Left	0	0	30	0	45	0
Volume Right	73	63	0	25	0	11
cSH	457	734	915	1700	1242	1700
Volume to Capacity	0.16	0.09	0.03	0.19	0.04	0.40
Queue Length 95th (ft)	14	7	3	0	3	0
Control Delay (s)	14.4	10.4	9.1	0.0	8.0	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	14.4	10.4	0.8		0.5	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	43.6%	ICU Level of Service		A
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	84	15	36	0	48	15	8	0	22	243	6	0	6	238	26
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	93	17	40	0	53	17	9	0	24	269	7	0	7	264	29
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		150			79			300			300	
Entry Volume veh/h		147			77			294			294	
Circulating Flow (Vc), pc/h	324			386			117			94		
Exiting Flow (Vex), pc/h	31			70			371			357		
Capacity (cPCE), pc/h		817			768			1005			1029	
Capacity (c), veh/h		801			753			986			1008	
v/c Ratio (X)		0.18			0.10			0.30			0.29	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.4			5.8			6.7			6.5	
Lane LOS		A			A			A			A	
95% Queue		0.7			0.3			1.3			1.2	
Approach Delay, s/veh	6.4			5.8			6.7			6.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.5						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - West
E/W Street Name	West Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	17	10	14	0	18	10	21	0	14	120	18	0	21	120	16
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	19	11	16	0	20	11	23	0	16	133	20	0	23	133	18
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		46			54			169			174	
Entry Volume veh/h		45			53			166			171	
Circulating Flow (Vc), pc/h	176			168			53			47		
Exiting Flow (Vex), pc/h	54			45			175			169		
Capacity (cPCE), pc/h		948			955			1072			1078	
Capacity (c), veh/h		929			937			1051			1057	
v/c Ratio (X)		0.05			0.06			0.16			0.16	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.3			4.4			4.9			4.9	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.2			0.6			0.6	
Approach Delay, s/veh	4.3			4.4			4.9			4.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	4.7						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Kelly
E/W Street Name	Kelly Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	13	17	11	0	12	10	89	0	4	141	12	0	81	134	27
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	14	19	12	0	13	11	99	0	4	156	13	0	90	149	30
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		45			123			173			269	
Entry Volume veh/h		44			121			170			264	
Circulating Flow (Vc), pc/h	252			174			123			28		
Exiting Flow (Vex), pc/h	122			45			269			174		
Capacity (cPCE), pc/h		878			950			999			1099	
Capacity (c), veh/h		861			931			980			1077	
v/c Ratio (X)		0.05			0.13			0.17			0.24	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.7			5.1			5.3			5.6	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.4			0.6			1.0	
Approach Delay, s/veh	4.7			5.1			5.3			5.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	5.4						A					

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Future Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				168	0	0	8	72	0	24	801	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				1328	0	593	148	1692	527	148	1178	527
Arrive On Green				0.36	0.00	0.00	0.08	0.32	0.00	0.08	0.32	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				168	0	0	8	72	0	24	801	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Cycle Q Clear(g_c), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				1328	0	593	148	1692	527	148	1178	527
V/C Ratio(X)				0.13	0.00	0.00	0.05	0.04	0.00	0.16	0.68	0.00
Avail Cap(c_a), veh/h				1328	0	593	148	1692	527	148	1178	527
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				10.7	0.0	0.0	21.3	11.7	0.0	21.4	14.8	0.0
Incr Delay (d2), s/veh				0.2	0.0	0.0	0.7	0.0	0.0	2.4	3.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	0.0	0.1	0.2	0.0	0.4	5.3	0.0
LnGrp Delay(d),s/veh				10.9	0.0	0.0	21.9	11.8	0.0	23.8	18.0	0.0
LnGrp LOS				B			C	B		C	B	
Approach Vol, veh/h					168			80			825	
Approach Delay, s/veh					10.9			12.8			18.1	
Approach LOS					B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	20.0			8.0	20.0		22.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	16.0			4.0	16.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	2.5			2.2	11.5		3.5
Green Ext Time (p_c), s	0.0	0.2			0.0	2.2		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	16.6
HCM 2010 LOS	B

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	531	188	479	1082	0	0
Future Volume (veh/h)	531	188	479	1082	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	577	204	521	1176		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1840	823	1074	3313		
Arrive On Green	0.50	0.50	0.30	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	577	204	521	1176		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	3.7	2.8	4.8	1.9		
Cycle Q Clear(g_c), s	3.7	2.8	4.8	1.9		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1840	823	1074	3313		
V/C Ratio(X)	0.31	0.25	0.49	0.35		
Avail Cap(c_a), veh/h	1840	823	1074	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.9	5.7	11.5	0.3		
Incr Delay (d2), s/veh	0.4	0.7	1.6	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.0	1.4	2.5	1.0		
LnGrp Delay(d),s/veh	6.4	6.4	13.0	0.6		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	781			1697		
Approach Delay, s/veh	6.4			4.4		
Approach LOS	A			A		

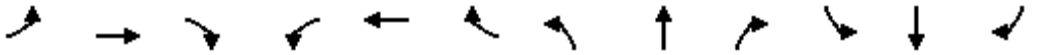
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			16.0	24.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			12.0	20.0				36.0
Max Q Clear Time (g_c+I1), s			6.8	5.7				3.9
Green Ext Time (p_c), s			1.0	4.0				10.8

Intersection Summary	
HCM 2010 Ctrl Delay	5.0
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	640	67	807	1970	67	1
Future Volume (veh/h)	640	67	807	1970	67	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	696	73	877	2141	73	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	982	439	954	2208	492	439
Arrive On Green	0.27	0.27	0.27	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	696	73	877	2141	73	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	10.3	2.0	14.3	33.4	1.8	0.0
Cycle Q Clear(g_c), s	10.3	2.0	14.3	33.4	1.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	982	439	954	2208	492	439
V/C Ratio(X)	0.71	0.17	0.92	0.97	0.15	0.00
Avail Cap(c_a), veh/h	982	439	954	2208	492	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.9	16.9	21.4	11.5	16.8	0.0
Incr Delay (d2), s/veh	4.3	0.8	15.1	13.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	1.0	8.9	20.4	1.0	0.0
LnGrp Delay(d),s/veh	24.2	17.7	36.5	24.7	17.4	0.0
LnGrp LOS	C	B	D	C	B	
Approach Vol, veh/h	769			3018	73	
Approach Delay, s/veh	23.6			28.1	17.4	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		3.8	16.3	12.3				35.4
Green Ext Time (p_c), s		0.1	0.0	1.7				0.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.0
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Future Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	312	3	100	542	0	11	0	121	24	34	35
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1149	11	284	1982	887	0	0	0	568	596	507
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3832	36	1845	3681	1647		0		1845	1937	1647
Grp Volume(v), veh/h	0	154	161	100	542	0		0.0		24	34	35
Grp Sat Flow(s),veh/h/ln	0	1840	1931	1845	1840	1647				1845	1937	1647
Q Serve(g_s), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Cycle Q Clear(g_c), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	566	594	284	1982	887				568	596	507
V/C Ratio(X)	0.00	0.27	0.27	0.35	0.27	0.00				0.04	0.06	0.07
Avail Cap(c_a), veh/h	0	566	594	284	1982	887				568	596	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.6	13.6	19.7	6.5	0.0				12.6	12.7	12.7
Incr Delay (d2), s/veh	0.0	1.2	1.1	3.4	0.3	0.0				0.1	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	1.9	1.5	2.1	0.0				0.3	0.4	0.4
LnGrp Delay(d),s/veh	0.0	14.8	14.7	23.1	6.8	0.0				12.8	12.9	13.0
LnGrp LOS		B	B	C	A					B	B	B
Approach Vol, veh/h		315			642						93	
Approach Delay, s/veh		14.7			9.4						12.9	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			4.5	5.3		2.8		6.1
Green Ext Time (p_c), s			0.1	1.3		0.2		3.7

Intersection Summary	
HCM 2010 Ctrl Delay	11.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Future Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	250	505	5	10	665	386	11	11	21	107	62	62
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	158	960	10	105	841	376	216	216	376	422	203	203
Arrive On Green	0.09	0.26	0.26	0.04	0.15	0.15	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3734	37	1845	3681	1647	945	945	1647	1845	890	890
Grp Volume(v), veh/h	250	249	261	10	665	386	22	0	21	107	0	124
Grp Sat Flow(s),veh/h/ln	1845	1840	1931	1845	1840	1647	1890	0	1647	1845	0	1780
Q Serve(g_s), s	6.0	8.1	8.1	0.4	12.2	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Cycle Q Clear(g_c), s	6.0	8.1	8.1	0.4	12.2	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Prop In Lane	1.00		0.02	1.00		1.00	0.50		1.00	1.00		0.50
Lane Grp Cap(c), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
V/C Ratio(X)	1.58	0.53	0.53	0.09	0.79	1.03	0.05	0.00	0.06	0.25	0.00	0.30
Avail Cap(c_a), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.0	22.3	22.3	31.9	28.0	29.6	21.1	0.0	21.1	22.1	0.0	22.4
Incr Delay (d2), s/veh	289.4	4.1	4.0	1.8	7.5	53.1	0.2	0.0	0.3	1.4	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.7	4.6	4.8	0.2	7.1	12.8	0.4	0.0	0.3	1.9	0.0	2.2
LnGrp Delay(d),s/veh	321.4	26.5	26.3	33.7	35.5	82.7	21.3	0.0	21.4	23.6	0.0	24.3
LnGrp LOS	F	C	C	C	D	F	C		C	C		C
Approach Vol, veh/h		760			1061			43			231	
Approach Delay, s/veh		123.4			52.7			21.3			24.0	
Approach LOS		F			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	10.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.7	2.4	10.1		6.0	8.0	18.0
Green Ext Time (p_c), s		0.1	0.0	1.9		0.7	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	74.5
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	492	362	132	894	400	422	443	376	422	443	376
Arrive On Green	0.07	0.24	0.24	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	2026	1489	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	388	355	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1674	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.0	14.1	14.3	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.0	14.1	14.3	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		0.89	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.87	0.87	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.6	25.4	25.5	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	19.8	22.1	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	9.6	9.1	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	51.7	45.2	47.5	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	D	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		46.9			43.4			27.3			30.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	16.3		11.8	5.0	17.8
Green Ext Time (p_c), s		1.3	0.0	0.4		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	38.7
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Future Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	93	8	17	71	42	2	5	7	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.8	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	15%	21%	13%
Vol Thru, %	38%	73%	54%
Vol Right, %	46%	6%	33%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	13	118	120
LT Vol	2	25	16
Through Vol	5	86	65
RT Vol	6	7	39
Lane Flow Rate	14	128	130
Geometry Grp	1	1	1
Degree of Util (X)	0.017	0.145	0.141
Departure Headway (Hd)	4.232	4.064	3.887
Convergence, Y/N	Yes	Yes	Yes
Cap	851	881	920
Service Time	2.232	2.093	1.921
HCM Lane V/C Ratio	0.016	0.145	0.141
HCM Control Delay	7.3	7.8	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.5

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Future Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	161	75	54	64	0	0	0	0	18	0	60

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	-	0	0	161	0	0	333	333	64
Stage 1	-	-	-	-	-	-	172	172	-
Stage 2	-	-	-	-	-	-	161	161	-
Critical Hdwy	-	-	-	4.12	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1418	-	0	662	587	1000
Stage 1	0	-	-	-	-	0	858	756	-
Stage 2	0	-	-	-	-	0	868	765	-
Platoon blocked, %		-	-		-				
Mov Cap-1 Maneuver	-	-	-	1418	-	-	636	0	1000
Mov Cap-2 Maneuver	-	-	-	-	-	-	636	0	-
Stage 1	-	-	-	-	-	-	825	0	-
Stage 2	-	-	-	-	-	-	868	0	-

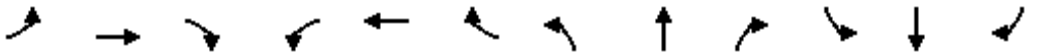
Approach	EB	WB	SB
HCM Control Delay, s	0	3.5	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1418	-	636	1000
HCM Lane V/C Ratio	-	-	0.038	-	0.029	0.06
HCM Control Delay (s)	-	-	7.6	0	10.8	8.8
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	518	201	1018	1229	17	967
Future Volume (veh/h)	518	201	1018	1229	17	967
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	563	0	1107	1336	18	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	883	395	1384	1317	394	618
Arrive On Green	0.24	0.00	0.39	0.68	0.21	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	563	0	1107	1336	18	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	10.3	0.0	20.6	51.0	0.6	0.0
Cycle Q Clear(g_c), s	10.3	0.0	20.6	51.0	0.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	883	395	1384	1317	394	618
V/C Ratio(X)	0.64	0.00	0.80	1.01	0.05	0.00
Avail Cap(c_a), veh/h	883	395	1384	1317	394	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.6	0.0	20.4	12.0	23.4	0.0
Incr Delay (d2), s/veh	3.5	0.0	4.9	28.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	11.1	36.7	0.3	0.0
LnGrp Delay(d),s/veh	29.1	0.0	25.4	40.4	23.7	0.0
LnGrp LOS	C		C	F	C	
Approach Vol, veh/h	563			2443	18	
Approach Delay, s/veh	29.1			33.6	23.7	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	33.0	22.0				55.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	29.0	18.0				51.0
Max Q Clear Time (g_c+I1), s		2.6	22.6	12.3				53.0
Green Ext Time (p_c), s		0.0	2.6	1.8				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	32.7
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	107	194	477	306	1676	214	38	179	121	74	78
Future Volume (vph)	273	107	194	477	306	1676	214	38	179	121	74	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3018	1441		1787	1583		1807	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3018	1441		1787	1583		1807	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	297	116	211	518	333	1822	233	41	195	132	80	85
RTOR Reduction (vph)	0	0	189	0	477	481	0	0	122	0	0	73
Lane Group Flow (vph)	297	116	22	518	767	430	0	274	73	0	212	12
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	17.0	9.6	9.6	34.2	28.4	28.4		16.3	16.3		13.1	13.1
Effective Green, g (s)	17.0	9.6	9.6	34.2	28.4	28.4		16.3	16.3		13.1	13.1
Actuated g/C Ratio	0.19	0.10	0.10	0.37	0.31	0.31		0.18	0.18		0.14	0.14
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	328	195	166	661	936	447		318	281		258	226
v/s Ratio Prot	c0.17	0.06		0.29	0.25			c0.15			c0.12	
v/s Ratio Perm			0.01			c0.30			0.05			0.01
v/c Ratio	0.91	0.59	0.13	0.78	0.97dr	0.96		0.86	0.26		0.82	0.05
Uniform Delay, d1	36.5	39.1	37.2	25.4	29.2	31.0		36.5	32.4		38.1	33.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	27.0	3.2	0.1	6.1	7.9	34.2		20.0	0.2		17.8	0.0
Delay (s)	63.5	42.3	37.3	31.4	37.1	65.2		56.5	32.6		55.9	33.9
Level of Service	E	D	D	C	D	E		E	C		E	C
Approach Delay (s)		50.7			45.6			46.5			49.6	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	46.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	91.5	Sum of lost time (s)	18.3
Intersection Capacity Utilization	109.1%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	669	0	323	0	0	437	681	0	557	561	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	0	0	742	0	351	0	0	484	755	0	618	622	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		0		0	742	351		484	755	618	622	
Entry Volume veh/h		0		0	727	351		475	740	606	610	
Circulating Flow (Vc), pc/h	1982			484			618			742		
Exiting Flow (Vex), pc/h	618			0			484			1364		
Capacity (cPCE), pc/h		156		786	805			733		648	672	
Capacity (c), veh/h		153		771	789			719		635	659	
v/c Ratio (X)		0.00		0.00	0.92			0.66		0.95	0.93	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.6		4.7	38.4	0.0		17.5	0.0	50.5	43.8	
Lane LOS		C		A	E	A		C	A	F	E	
95% Queue		0.0		0.0	13.1			5.0		13.4	12.4	
Approach Delay, s/veh				25.9			6.8			47.2		
Approach LOS				D			A			E		
Intersection Delay, s/veh / LOS	26.7						D					

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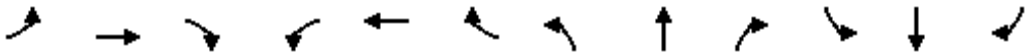

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	21	11	91	36	158	17	102	95	182	139	12
Future Volume (vph)	0	21	11	91	36	158	17	102	95	182	139	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	12	99	39	172	18	111	103	198	151	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	35	310	232	362
Volume Left (vph)	0	99	18	198
Volume Right (vph)	12	172	103	13
Hadj (s)	-0.17	-0.24	-0.22	0.12
Departure Headway (s)	5.9	5.3	5.2	5.4
Degree Utilization, x	0.06	0.46	0.34	0.54
Capacity (veh/h)	496	629	630	640
Control Delay (s)	9.3	12.7	10.9	14.4
Approach Delay (s)	9.3	12.7	10.9	14.4
Approach LOS	A	B	B	B

Intersection Summary				
Delay	12.8			
Level of Service	B			
Intersection Capacity Utilization	63.5%	ICU Level of Service	B	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	669	0	323	0	0	437	681	0	557	561	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	0	0	742	0	351	0	0	484	755	0	618	622	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		0		0	742	351		484	755	618	622	
Entry Volume veh/h		0		0	727	351		475	740	606	610	
Circulating Flow (Vc), pc/h	1982			484			618			742		
Exiting Flow (Vex), pc/h	618			0			484			1364		
Capacity (cPCE), pc/h		156		786	805			733		648	672	
Capacity (c), veh/h		153		771	789			719		635	659	
v/c Ratio (X)		0.00		0.00	0.92			0.66		0.95	0.93	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.6		4.7	38.4	0.0		17.5	0.0	50.5	43.8	
Lane LOS		C		A	E	A		C	A	F	E	
95% Queue		0.0		0.0	13.1			5.0		13.4	12.4	
Approach Delay, s/veh				25.9			6.8			47.2		
Approach LOS				D			A			E		
Intersection Delay, s/veh / LOS	26.7						D					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	37	40	34	0	37	47	79	0	28	732	68	0	44	764	31
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	41	44	38	0	41	52	88	0	31	812	75	0	49	847	34
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		123			181			918			930	
Entry Volume veh/h		121			177			900			912	
Circulating Flow (Vc), pc/h	937			884			134			124		
Exiting Flow (Vex), pc/h	168			117			941			926		
Capacity (cPCE), pc/h		443			467			988			998	
Capacity (c), veh/h		434			458			969			979	
v/c Ratio (X)		0.28			0.39			0.93			0.93	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.8			14.7			34.9			35.1	
Lane LOS		B			B			D			E	
95% Queue		1.1			1.8			14.6			14.8	
Approach Delay, s/veh	12.8			14.7			34.9			35.1		
Approach LOS	B			B			D			E		
Intersection Delay, s/veh / LOS	32.0						D					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/12/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	48	38	53	0	23	38	64	0	40	717	53	0	29	717	90
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	53	42	59	0	26	42	71	0	44	795	59	0	32	795	100
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		154			139			898			927	
Entry Volume veh/h		151			136			880			909	
Circulating Flow (Vc), pc/h	853			892			127			112		
Exiting Flow (Vex), pc/h	133			186			919			880		
Capacity (cPCE), pc/h		482			463			995			1010	
Capacity (c), veh/h		472			454			976			990	
v/c Ratio (X)		0.32			0.30			0.90			0.92	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.8			12.8			30.7			32.6	
Lane LOS		B			B			D			D	
95% Queue		1.4			1.2			13.2			14.1	
Approach Delay, s/veh	12.8			12.8			30.7			32.6		
Approach LOS	B			B			D			D		
Intersection Delay, s/veh / LOS	29.1						D					

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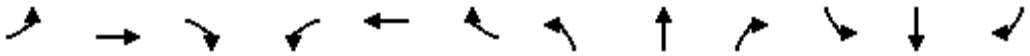


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	8	114	55	8	13	39	393	26	13	354	12
Future Volume (vph)	14	8	114	55	8	13	39	393	26	13	354	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	9	124	60	9	14	42	427	28	14	385	13

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	24	124	83	256	242	207	206
Volume Left (vph)	15	0	60	42	0	14	0
Volume Right (vph)	0	124	14	0	28	0	13
Hadj (s)	0.35	-0.67	0.08	0.12	-0.05	0.07	-0.01
Departure Headway (s)	7.2	6.2	6.9	5.9	5.7	6.0	5.9
Degree Utilization, x	0.05	0.21	0.16	0.42	0.39	0.34	0.34
Capacity (veh/h)	459	533	477	591	607	581	589
Control Delay (s)	9.3	9.6	11.2	11.9	11.1	10.8	10.6
Approach Delay (s)	9.6		11.2	11.5		10.7	
Approach LOS	A		B	B		B	

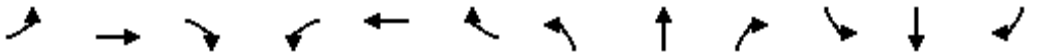
Intersection Summary				
Delay	11.0			
Level of Service	B			
Intersection Capacity Utilization	44.3%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	293	100	180	204	73	211
Future Volume (vph)	293	100	180	204	73	211
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	318	109	196	222	79	229

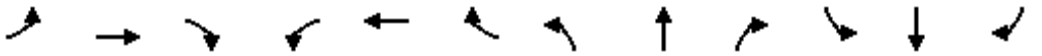
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	318	109	418	308
Volume Left (vph)	318	0	0	79
Volume Right (vph)	0	109	222	0
Hadj (s)	0.53	-0.67	-0.28	0.09
Departure Headway (s)	7.0	5.8	5.5	6.0
Degree Utilization, x	0.62	0.18	0.64	0.52
Capacity (veh/h)	482	588	626	569
Control Delay (s)	19.8	8.9	17.8	15.3
Approach Delay (s)	17.0		17.8	15.3
Approach LOS	C		C	C

Intersection Summary			
Delay	16.8		
Level of Service	C		
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	0	346	90	311	90	0	0	0	0	135	96
Future Volume (vph)	46	0	346	90	311	90	0	0	0	0	135	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.94	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3420						3319	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3420						3319	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	0	376	98	338	98	0	0	0	0	147	104
RTOR Reduction (vph)	0	0	309	71	48	0	0	0	0	0	84	0
Lane Group Flow (vph)	50	0	67	27	388	0	0	0	0	0	167	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	6.8		6.8	10.5	10.5						7.3	
Effective Green, g (s)	6.8		6.8	10.5	10.5						7.3	
Actuated g/C Ratio	0.18		0.18	0.28	0.28						0.19	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	315		497	487	942						635	
v/s Ratio Prot	c0.03		0.02	0.02	c0.11						c0.05	
v/s Ratio Perm												
v/c Ratio	0.16		0.14	0.06	0.41						0.26	
Uniform Delay, d1	13.2		13.2	10.2	11.3						13.1	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.2		0.1	0.0	0.3						0.2	
Delay (s)	13.5		13.3	10.2	11.6						13.3	
Level of Service	B		B	B	B						B	
Approach Delay (s)		13.3			11.3			0.0			13.3	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	38.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	210	436	77	278	745	0	0	625	197
Future Volume (vph)	0	0	0	210	436	77	278	745	0	0	625	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.96
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1515	1770	1863			1760	1451
Flt Permitted				0.95	1.00	1.00	0.12	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1515	231	1863			1760	1451
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	228	474	84	302	810	0	0	679	214
RTOR Reduction (vph)	0	0	0	0	0	66	0	0	0	0	1	48
Lane Group Flow (vph)	0	0	0	228	474	18	302	810	0	0	699	145
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.1	18.1	18.1	57.4	57.4			37.1	37.1
Effective Green, g (s)				18.1	18.1	18.1	57.4	57.4			37.1	37.1
Actuated g/C Ratio				0.21	0.21	0.21	0.67	0.67			0.43	0.43
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				374	749	320	430	1250			763	629
v/s Ratio Prot				0.13	c0.13		0.13	c0.43			c0.40	
v/s Ratio Perm						0.01	0.35					0.10
v/c Ratio				0.61	0.63	0.06	0.70	0.65			0.92	0.23
Uniform Delay, d1				30.5	30.7	26.9	25.1	8.2			22.7	15.2
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				7.2	4.0	0.3	5.5	1.3			15.8	0.3
Delay (s)				37.7	34.7	27.2	30.6	9.5			38.6	15.5
Level of Service				D	C	C	C	A			D	B
Approach Delay (s)		0.0			34.8			15.2			33.6	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	85.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	151	0	134	744	292	16	82	322	406	54	22
Future Volume (vph)	19	151	0	134	744	292	16	82	322	406	54	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	4.0		4.6	4.0	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539		1770	3539	1583		1848	1583	1681	1688	
Flt Permitted	0.29	1.00		0.65	1.00	1.00		0.93	1.00	0.69	0.73	
Satd. Flow (perm)	533	3539		1207	3539	1583		1739	1583	1219	1272	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	164	0	146	809	317	17	89	350	441	59	24
RTOR Reduction (vph)	0	0	0	0	0	317	0	0	350	0	7	0
Lane Group Flow (vph)	21	164	0	146	809	0	0	106	0	256	261	0
Turn Type	Perm	NA		Perm	NA	NA	Perm	NA	NA	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.2	17.2		16.8	16.8	0.0		16.2	0.0	16.2	16.2	
Effective Green, g (s)	17.2	17.2		16.8	16.8	0.0		16.2	0.0	16.2	16.2	
Actuated g/C Ratio	0.40	0.40		0.39	0.39	0.00		0.38	0.00	0.38	0.38	
Clearance Time (s)	4.6	4.6		5.0	5.0			4.6		4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5			4.0		4.0	4.0	
Lane Grp Cap (vph)	215	1428		476	1395	0		661	0	463	483	
v/s Ratio Prot		0.05			c0.23							
v/s Ratio Perm	0.04			0.12				0.06		c0.21	0.21	
v/c Ratio	0.10	0.11		0.31	0.58	0.00		0.16	0.00	0.55	0.54	
Uniform Delay, d1	7.9	7.9		8.9	10.1	21.3		8.7	21.3	10.4	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.0		0.4	0.6	0.0		0.2	0.0	1.8	1.6	
Delay (s)	8.2	8.0		9.3	10.8	21.3		8.9	21.3	12.1	11.8	
Level of Service	A	A		A	B	C		A	C	B	B	
Approach Delay (s)		8.0			13.2			18.4			12.0	
Approach LOS		A			B			B			B	

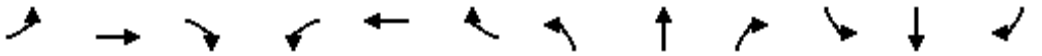
Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	42.6	Sum of lost time (s)	9.6
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	321	16	24	66	25	30
Future Volume (Veh/h)	321	16	24	66	25	30
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	349	17	26	72	27	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			366		482	358
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			366		482	358
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		95	95
cM capacity (veh/h)			1193		532	687

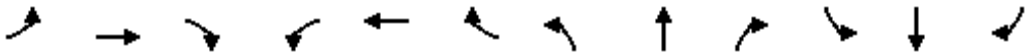
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	366	98	60
Volume Left	0	26	27
Volume Right	17	0	33
cSH	1700	1193	607
Volume to Capacity	0.22	0.02	0.10
Queue Length 95th (ft)	0	2	8
Control Delay (s)	0.0	2.3	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	2.3	11.6
Approach LOS			B

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	355	221	226	0	0	0	94	507	160	170	435	116
Future Volume (vph)	355	221	226	0	0	0	94	507	160	170	435	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.94				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1493				1770	1863	1552	1770	1863	1516
Flt Permitted	0.95	1.00	1.00				0.49	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1770	1863	1493				917	1863	1552	347	1863	1516
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	386	240	246	0	0	0	102	551	174	185	473	126
RTOR Reduction (vph)	0	0	166	0	0	0	0	0	91	0	0	59
Lane Group Flow (vph)	386	240	80	0	0	0	102	551	83	185	473	67
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	19.5	19.5	19.5				22.7	22.7	22.7	31.7	31.7	31.7
Effective Green, g (s)	19.5	19.5	19.5				22.7	22.7	22.7	31.7	31.7	31.7
Actuated g/C Ratio	0.32	0.32	0.32				0.38	0.38	0.38	0.53	0.53	0.53
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	575	605	485				346	704	587	301	984	800
v/s Ratio Prot	c0.22	0.13						c0.30		c0.05	0.25	
v/s Ratio Perm			0.05				0.11		0.05	0.27		0.04
v/c Ratio	0.67	0.40	0.16				0.29	0.78	0.14	0.61	0.48	0.08
Uniform Delay, d1	17.5	15.7	14.4				13.0	16.5	12.3	10.1	8.9	7.0
Progression Factor	1.00	1.00	1.00				1.07	1.07	1.64	1.00	1.00	1.00
Incremental Delay, d2	6.1	1.9	0.7				1.9	7.4	0.4	3.7	1.7	0.2
Delay (s)	23.6	17.6	15.2				15.9	25.1	20.5	13.8	10.6	7.2
Level of Service	C	B	B				B	C	C	B	B	A
Approach Delay (s)		19.6			0.0			23.0			10.8	
Approach LOS		B			A			C			B	

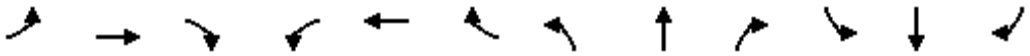
Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	588	36	0	0	0	0	10	36	29	27	0
Future Volume (Veh/h)	16	588	36	0	0	0	0	10	36	29	27	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	639	39	0	0	0	0	11	39	32	29	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			678			707	692	339	398	712	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			678			707	692	339	398	712	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	93	92	100
cM capacity (veh/h)	1622			910			300	362	657	489	352	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	336	358	50	61
Volume Left	17	0	0	32
Volume Right	0	39	39	0
cSH	1622	1700	557	413
Volume to Capacity	0.01	0.21	0.09	0.15
Queue Length 95th (ft)	1	0	7	13
Control Delay (s)	0.5	0.0	12.1	15.2
Lane LOS	A		B	C
Approach Delay (s)	0.2		12.1	15.2
Approach LOS			B	C

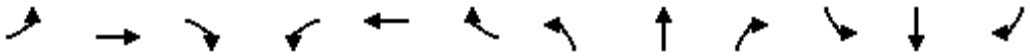
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	34.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Future Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	1388	28	0	0	0	0	14	36	64	52	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	736	722	50	116
Volume Left (vph)	42	0	0	64
Volume Right (vph)	0	28	36	0
Hadj (s)	0.06	0.01	-0.40	0.14
Departure Headway (s)	5.1	5.0	5.6	6.0
Degree Utilization, x	1.00	1.00	0.08	0.19
Capacity (veh/h)	736	722	628	586
Control Delay (s)	54.7	54.4	9.1	10.4
Approach Delay (s)	54.5		9.1	10.4
Approach LOS	F		A	B

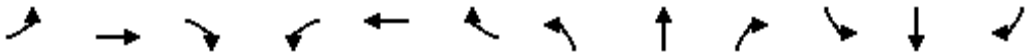
Intersection Summary				
Delay	50.0			
Level of Service	E			
Intersection Capacity Utilization	56.4%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	291	524	13	43	0	21	0	19	12	0	0	0
Future Volume (vph)	291	524	13	43	0	21	0	19	12	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	316	570	14	47	0	23	0	21	13	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	316	584	70	34
Volume Left (vph)	316	0	47	0
Volume Right (vph)	0	14	23	13
Hadj (s)	0.53	0.02	-0.03	-0.20
Departure Headway (s)	5.2	4.7	4.8	5.4
Degree Utilization, x	0.46	0.76	0.09	0.05
Capacity (veh/h)	689	758	732	622
Control Delay (s)	11.3	19.5	8.3	8.7
Approach Delay (s)	16.6		8.3	8.7
Approach LOS	C		A	A

Intersection Summary				
Delay	15.8			
Level of Service	C			
Intersection Capacity Utilization	45.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	39	0	0	51	17	549	74	37	503	18
Future Volume (Veh/h)	0	0	39	0	0	51	17	549	74	37	503	18
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	42	0	0	55	18	597	80	40	547	20
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked	0.85	0.85	0.84	0.85	0.85	0.98	0.84			0.98		
vC, conflicting volume	1332	1364	564	1349	1334	644	574			684		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1247	1284	390	1267	1249	625	402			666		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	88	98			96		
cM capacity (veh/h)	106	130	552	107	137	471	970			896		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	42	55	18	677	40	567
Volume Left	0	0	18	0	40	0
Volume Right	42	55	0	80	0	20
cSH	552	471	970	1700	896	1700
Volume to Capacity	0.08	0.12	0.02	0.40	0.04	0.33
Queue Length 95th (ft)	6	10	1	0	3	0
Control Delay (s)	12.1	13.7	8.8	0.0	9.2	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.1	13.7	0.2		0.6	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	43.5%	ICU Level of Service		A
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	0	71	0	64	14	12	0	46	540	19	0	24	490	61
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	16	0	79	0	71	16	13	0	51	599	21	0	27	543	68
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		95			100			671			638	
Entry Volume veh/h		93			98			658			625	
Circulating Flow (Vc), pc/h	641			666			43			138		
Exiting Flow (Vex), pc/h	48			135			628			693		
Capacity (cPCE), pc/h		595			581			1082			984	
Capacity (c), veh/h		584			569			1061			965	
v/c Ratio (X)		0.16			0.17			0.62			0.65	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.1			8.5			11.9			13.6	
Lane LOS		A			A			B			B	
95% Queue		0.6			0.6			4.5			4.9	
Approach Delay, s/veh	8.1			8.5			11.9			13.6		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	12.1						B					

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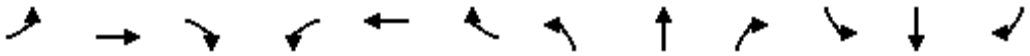
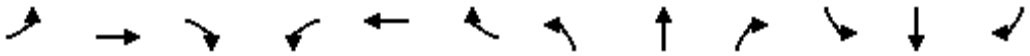


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	46	78	26	87	6	135	4	257	70	161	158	2
Future Volume (vph)	46	78	26	87	6	135	4	257	70	161	158	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	85	28	95	7	147	4	279	76	175	172	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	163	249	359	349
Volume Left (vph)	50	95	4	175
Volume Right (vph)	28	147	76	2
Hadj (s)	-0.01	-0.24	-0.09	0.13
Departure Headway (s)	6.6	6.2	5.9	6.1
Degree Utilization, x	0.30	0.43	0.59	0.59
Capacity (veh/h)	458	509	573	549
Control Delay (s)	12.5	13.7	16.8	17.5
Approach Delay (s)	12.5	13.7	16.8	17.5
Approach LOS	B	B	C	C

Intersection Summary				
Delay	15.7			
Level of Service	C			
Intersection Capacity Utilization	64.7%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	332	43	19	231	35	41	63	65	28	83	14
Future Volume (Veh/h)	12	332	43	19	231	35	41	63	65	28	83	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	361	47	21	251	38	45	68	71	30	90	15
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	303			415			790	762	392	842	767	285
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	303			415			790	762	392	842	767	285
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			80	79	89	85	72	98
cM capacity (veh/h)	1243			1137			226	319	653	202	317	745

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	421	310	184	135
Volume Left	13	21	45	30
Volume Right	47	38	71	15
cSH	1243	1137	353	299
Volume to Capacity	0.01	0.02	0.52	0.45
Queue Length 95th (ft)	1	1	72	56
Control Delay (s)	0.4	0.7	25.7	26.6
Lane LOS	A	A	D	D
Approach Delay (s)	0.4	0.7	25.7	26.6
Approach LOS			D	D

Intersection Summary				
Average Delay	8.3			
Intersection Capacity Utilization	43.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	99	130	175	0	126	105	22	0	153	529	138	0	24	529	49
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	110	144	194	0	140	116	24	0	170	586	153	0	27	586	54
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		448			280			909			667	
Entry Volume veh/h		439			275			891			654	
Circulating Flow (Vc), pc/h		753			866			281			426	
Exiting Flow (Vex), pc/h		324			340			720			920	
Capacity (cPCE), pc/h		532			475			853			738	
Capacity (c), veh/h		522			466			836			724	
v/c Ratio (X)		0.84			0.59			1.07			0.90	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		37.8			21.2			71.8			37.8	
Lane LOS		E			C			F			E	
95% Queue		8.7			3.7			22.0			11.9	
Approach Delay, s/veh	37.8			21.2			71.8			37.8		
Approach LOS	E			C			F			E		
Intersection Delay, s/veh / LOS	49.2						E					

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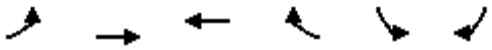
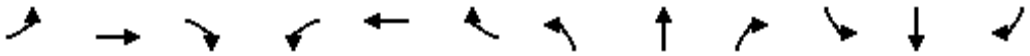


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	460	342	24	36	38
Future Volume (Veh/h)	9	460	342	24	36	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	500	372	26	39	41
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	406				914	394
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	406				914	394
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				87	94
cM capacity (veh/h)	1145				298	650

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	510	398	80
Volume Left	10	0	39
Volume Right	0	26	41
cSH	1145	1700	413
Volume to Capacity	0.01	0.23	0.19
Queue Length 95th (ft)	1	0	18
Control Delay (s)	0.3	0.0	15.8
Lane LOS	A		C
Approach Delay (s)	0.3	0.0	15.8
Approach LOS			C

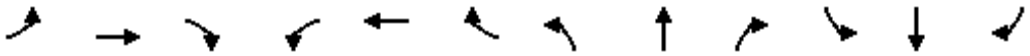
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	474	4	2	316	29	2	1	3	44	0	35
Future Volume (Veh/h)	26	474	4	2	316	29	2	1	3	44	0	35
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	515	4	2	343	32	2	1	3	48	0	38
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	377			519			976	954	517	942	940	363
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	377			519			976	954	517	942	940	363
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			99	100	99	80	100	94
cM capacity (veh/h)	1180			1047			213	252	558	236	256	680

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	547	377	6	86
Volume Left	28	2	2	48
Volume Right	4	32	3	38
cSH	1180	1047	320	331
Volume to Capacity	0.02	0.00	0.02	0.26
Queue Length 95th (ft)	2	0	1	25
Control Delay (s)	0.7	0.1	16.5	19.6
Lane LOS	A	A	C	C
Approach Delay (s)	0.7	0.1	16.5	19.6
Approach LOS			C	C

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	58.2%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	272	285	82	196	0	170	0	114	0	0	0
Future Volume (vph)	0	272	285	82	196	0	170	0	114	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	296	310	89	213	0	185	0	124	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	606	302	309	0
Volume Left (vph)	0	89	185	0
Volume Right (vph)	310	0	124	0
Hadj (s)	-0.27	0.09	-0.09	0.00
Departure Headway (s)	5.2	6.0	6.2	7.2
Degree Utilization, x	0.87	0.50	0.53	0.00
Capacity (veh/h)	606	569	551	900
Control Delay (s)	33.1	14.8	15.9	10.2
Approach Delay (s)	33.1	14.8	15.9	0.0
Approach LOS	D	B	C	A

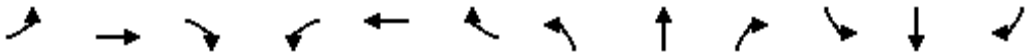
Intersection Summary				
Delay		24.2		
Level of Service		C		
Intersection Capacity Utilization		79.2%	ICU Level of Service	D
Analysis Period (min)		15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	64	131	185	94	94	180
Future Volume (vph)	64	131	185	94	94	180
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	70	142	201	102	102	196

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	212	303	298
Volume Left (vph)	70	0	102
Volume Right (vph)	142	102	0
Hadj (s)	-0.30	-0.17	0.10
Departure Headway (s)	5.0	4.7	4.9
Degree Utilization, x	0.30	0.39	0.41
Capacity (veh/h)	653	733	694
Control Delay (s)	10.1	10.7	11.3
Approach Delay (s)	10.1	10.7	11.3
Approach LOS	B	B	B

Intersection Summary			
Delay	10.8		
Level of Service	B		
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	375	22	20	310	69	30	42	40	75	26	21
Future Volume (Veh/h)	14	375	22	20	310	69	30	42	40	75	26	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	408	24	22	337	75	33	46	43	82	28	23
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.90						0.90	0.90		0.90	0.90	0.90
vC, conflicting volume	415			443			920	920	439	946	894	382
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	289			443			853	853	439	881	824	252
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			84	82	93	55	89	97
cM capacity (veh/h)	1138			1107			212	254	608	184	264	701

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	447	434	122	133
Volume Left	15	22	33	82
Volume Right	24	75	43	23
cSH	1138	1107	299	227
Volume to Capacity	0.01	0.02	0.41	0.59
Queue Length 95th (ft)	1	2	47	83
Control Delay (s)	0.4	0.6	25.0	41.1
Lane LOS	A	A	D	E
Approach Delay (s)	0.4	0.6	25.0	41.1
Approach LOS			D	E

Intersection Summary				
Average Delay	7.9			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Oceanside Blvd
E/W Street Name	Oceanside Boulevard
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	1	1	0	0	0	1	1	0	0	1	0
Lane Assignment			LTR		L		TR		LT		R				LTR	
Volume (V), veh/h	0	58	230	90	0	252	223	211	0	94	577	162	0	217	490	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	64	255	100	0	279	247	234	0	104	640	180	0	241	543	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	2				1				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		4.1129		5.1929	5.1929		4.2929	4.1129			4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858		3.1858	3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		419		279	481		744	180			817	
Entry Volume veh/h		411		274	472		729	176			801	
Circulating Flow (Vc), pc/h	1063			808			560			630		
Exiting Flow (Vex), pc/h	676			384			938			922		
Capacity (cPCE), pc/h		537		504	504		742	764			727	
Capacity (c), veh/h		526		494	494		728	749			713	
v/c Ratio (X)		0.78		0.55	0.95		1.00	0.24			1.12	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		30.9		18.7	58.8		57.6	7.5			95.6	
Lane LOS		D		C	F		F	A			F	
95% Queue		7.1		3.3	12.0		16.6	0.9			23.7	
Approach Delay, s/veh	30.9			44.1			47.9			95.6		
Approach LOS	D			E			E			F		
Intersection Delay, s/veh / LOS	57.8						F					

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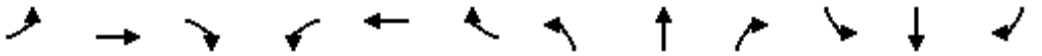

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	646	6	22	718	196	9	18	58	366	14	90
Future Volume (vph)	45	646	6	22	718	196	9	18	58	366	14	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3533		1761	3415			3131			1776	1524
Flt Permitted	0.19	1.00		0.28	1.00			0.92			0.66	1.00
Satd. Flow (perm)	350	3533		521	3415			2885			1235	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	702	7	24	780	213	10	20	63	398	15	98
RTOR Reduction (vph)	0	1	0	0	44	0	0	32	0	0	0	40
Lane Group Flow (vph)	49	708	0	24	949	0	0	61	0	0	413	58
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	21.3	21.3		21.3	21.3			29.2			29.2	29.2
Effective Green, g (s)	21.3	21.3		21.3	21.3			29.2			29.2	29.2
Actuated g/C Ratio	0.36	0.36		0.36	0.36			0.49			0.49	0.49
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	124	1254		184	1212			1404			601	741
v/s Ratio Prot		0.20			c0.28							
v/s Ratio Perm	0.14			0.05				0.02			c0.33	0.04
v/c Ratio	0.40	0.56		0.13	0.78			0.04			0.69	0.08
Uniform Delay, d1	14.5	15.6		13.1	17.3			8.1			11.9	8.2
Progression Factor	1.02	1.08		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.7	0.2		0.3	3.4			0.1			6.3	0.2
Delay (s)	15.6	17.1		13.4	20.7			8.1			18.2	8.4
Level of Service	B	B		B	C			A			B	A
Approach Delay (s)		17.0			20.5			8.1			16.3	
Approach LOS		B			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2035
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Morse Street
E/W Street Name	Morse Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	40	15	15	0	50	15	167	0	20	737	91	0	213	768	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	44	17	17	0	55	17	185	0	22	817	101	0	236	851	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		78			257			940			1107	
Entry Volume veh/h		76			252			922			1085	
Circulating Flow (Vc), pc/h	1142			883			297			94		
Exiting Flow (Vex), pc/h	354			59			1046			923		
Capacity (cPCE), pc/h		361			467			840			1029	
Capacity (c), veh/h		354			458			823			1008	
v/c Ratio (X)		0.22			0.55			1.12			1.08	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		14.0			19.8			90.4			70.7	
Lane LOS		B			C			F			F	
95% Queue		0.8			3.3			25.7			25.5	
Approach Delay, s/veh	14.0			19.8			90.4			70.7		
Approach LOS	B			C			F			F		
Intersection Delay, s/veh / LOS	71.1						F					

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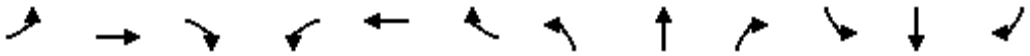
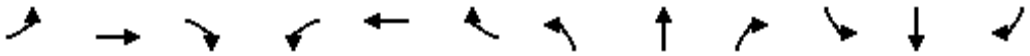


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	292	31	34	177	0	69	0	59	0	0	0
Future Volume (Veh/h)	0	292	31	34	177	0	69	0	59	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	317	34	37	192	0	75	0	64	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	192			351			600	600	334	664	617	192
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	192			351			600	600	334	664	617	192
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			81	100	91	100	100	100
cM capacity (veh/h)	1381			1208			403	402	708	332	393	850

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	351	229	139	0
Volume Left	0	37	75	0
Volume Right	34	0	64	0
cSH	1381	1208	503	1700
Volume to Capacity	0.00	0.03	0.28	0.00
Queue Length 95th (ft)	0	2	28	0
Control Delay (s)	0.0	1.5	14.9	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	1.5	14.9	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	45.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	169	38	0	65	0	38	1	12	0	0	0
Future Volume (Veh/h)	0	169	38	0	65	0	38	1	12	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	184	41	0	71	0	41	1	13	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	71			225			276	276	204	289	296	71
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	71			225			276	276	204	289	296	71
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			94	100	98	100	100	100
cM capacity (veh/h)	1529			1344			677	632	836	652	616	991

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	225	71	55	0
Volume Left	0	0	41	0
Volume Right	41	0	13	0
cSH	1529	1344	708	1700
Volume to Capacity	0.00	0.00	0.08	0.00
Queue Length 95th (ft)	0	0	6	0
Control Delay (s)	0.0	0.0	10.5	0.0
Lane LOS			B	A
Approach Delay (s)	0.0	0.0	10.5	0.0
Approach LOS			B	A

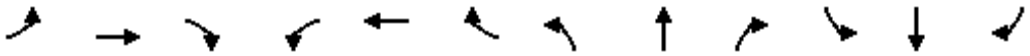
Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	21.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	82	248	26	47	296	26
Future Volume (vph)	82	248	26	47	296	26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	270	28	51	322	28

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	359	79	350
Volume Left (vph)	89	0	322
Volume Right (vph)	270	51	0
Hadj (s)	-0.37	-0.35	0.22
Departure Headway (s)	4.6	4.9	5.1
Degree Utilization, x	0.46	0.11	0.50
Capacity (veh/h)	731	659	668
Control Delay (s)	11.6	8.5	13.1
Approach Delay (s)	11.6	8.5	13.1
Approach LOS	B	A	B

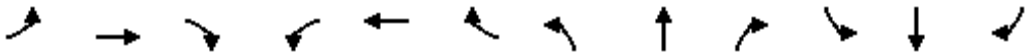
Intersection Summary			
Delay	12.0		
Level of Service	B		
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	203	103	14	159	14	140	17	18	4	12	21
Future Volume (Veh/h)	9	203	103	14	159	14	140	17	18	4	12	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	221	112	15	173	15	152	18	20	4	13	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	188			333			537	515	277	536	564	180
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	188			333			537	515	277	536	564	180
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			64	96	97	99	97	97
cM capacity (veh/h)	1386			1226			426	455	762	423	427	862

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	343	203	190	40
Volume Left	10	15	152	4
Volume Right	112	15	20	23
cSH	1386	1226	449	601
Volume to Capacity	0.01	0.01	0.42	0.07
Queue Length 95th (ft)	1	1	52	5
Control Delay (s)	0.3	0.7	18.7	11.4
Lane LOS	A	A	C	B
Approach Delay (s)	0.3	0.7	18.7	11.4
Approach LOS			C	B

Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	42.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	227	3	9	189	4	2	2	8	2	1	1
Future Volume (Veh/h)	1	227	3	9	189	4	2	2	8	2	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	247	3	10	205	4	2	2	9	2	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	209			250			479	480	248	488	479	207
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	209			250			479	480	248	488	479	207
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	99	100	100	100
cM capacity (veh/h)	1362			1316			492	481	790	480	482	833

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	251	219	13	4
Volume Left	1	10	2	2
Volume Right	3	4	9	1
cSH	1362	1316	663	538
Volume to Capacity	0.00	0.01	0.02	0.01
Queue Length 95th (ft)	0	1	1	1
Control Delay (s)	0.0	0.4	10.5	11.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.0	0.4	10.5	11.7
Approach LOS			B	B

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	26.7%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2035
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Cassidy Street
E/W Street Name	Cassidy Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	96	218	192	0	81	126	36	0	212	786	117	0	145	623	74
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	106	242	213	0	90	140	40	0	235	871	130	0	161	691	82
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		561			270			1236			934	
Entry Volume veh/h		550			265			1212			916	
Circulating Flow (Vc), pc/h		942			1212			509			465	
Exiting Flow (Vex), pc/h		533			457			1017			994	
Capacity (cPCE), pc/h		441			336			679			710	
Capacity (c), veh/h		432			330			666			696	
v/c Ratio (X)		1.27			0.80			1.82			1.32	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		167.4			47.5			390.9			171.3	
Lane LOS		F			E			F			F	
95% Queue		23.5			6.7			74.3			36.8	
Approach Delay, s/veh	167.4			47.5			390.9			171.3		
Approach LOS	F			E			F			F		
Intersection Delay, s/veh / LOS	249.9						F					

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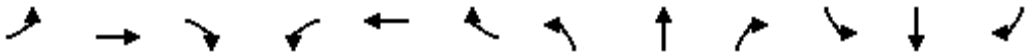
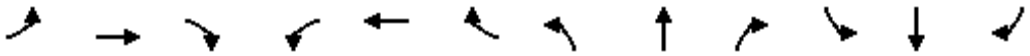


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	167	58	56	75	12	67	69	26	19	27	22
Future Volume (Veh/h)	22	167	58	56	75	12	67	69	26	19	27	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	182	63	61	82	13	73	75	28	21	29	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	95			245			510	478	214	538	504	88
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	95			245			510	478	214	538	504	88
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			95			83	84	97	94	93	98
cM capacity (veh/h)	1499			1321			418	456	827	366	442	970

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	269	156	176	74
Volume Left	24	61	73	21
Volume Right	63	13	28	24
cSH	1499	1321	472	501
Volume to Capacity	0.02	0.05	0.37	0.15
Queue Length 95th (ft)	1	4	43	13
Control Delay (s)	0.8	3.3	17.1	13.4
Lane LOS	A	A	C	B
Approach Delay (s)	0.8	3.3	17.1	13.4
Approach LOS			C	B

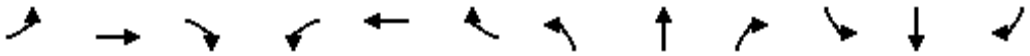
Intersection Summary				
Average Delay	7.0			
Intersection Capacity Utilization	42.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	85	11	13	40	2	14	24	13	3	11	5
Future Volume (vph)	7	85	11	13	40	2	14	24	13	3	11	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	92	12	14	43	2	15	26	14	3	12	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	112	59	55	20
Volume Left (vph)	8	14	15	3
Volume Right (vph)	12	2	14	5
Hadj (s)	-0.02	0.06	-0.06	-0.09
Departure Headway (s)	4.1	4.2	4.2	4.2
Degree Utilization, x	0.13	0.07	0.06	0.02
Capacity (veh/h)	854	827	809	808
Control Delay (s)	7.7	7.6	7.5	7.3
Approach Delay (s)	7.7	7.6	7.5	7.3
Approach LOS	A	A	A	A

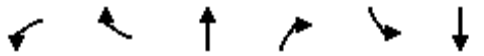
Intersection Summary				
Delay	7.6			
Level of Service	A			
Intersection Capacity Utilization	18.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	154	12	64	66	44	12	104	144	84	22	5
Future Volume (vph)	19	154	12	64	66	44	12	104	144	84	22	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	167	13	70	72	48	13	113	157	91	24	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	201	190	283	120
Volume Left (vph)	21	70	13	91
Volume Right (vph)	13	48	157	5
Hadj (s)	0.02	-0.04	-0.29	0.16
Departure Headway (s)	5.3	5.2	4.9	5.6
Degree Utilization, x	0.29	0.28	0.38	0.19
Capacity (veh/h)	626	630	682	586
Control Delay (s)	10.5	10.2	10.9	9.8
Approach Delay (s)	10.5	10.2	10.9	9.8
Approach LOS	B	B	B	A

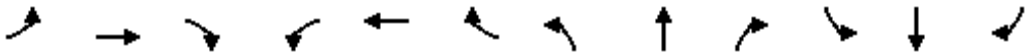
Intersection Summary				
Delay	10.5			
Level of Service	B			
Intersection Capacity Utilization	54.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	98	113	7	64	43
Future Volume (vph)	0	98	113	7	64	43
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	107	123	8	70	47

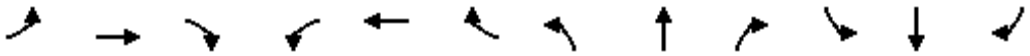
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	107	131	117
Volume Left (vph)	0	0	70
Volume Right (vph)	107	8	0
Hadj (s)	-0.57	0.00	0.15
Departure Headway (s)	3.9	4.2	4.4
Degree Utilization, x	0.12	0.15	0.14
Capacity (veh/h)	871	817	781
Control Delay (s)	7.4	8.0	8.2
Approach Delay (s)	7.4	8.0	8.2
Approach LOS	A	A	A

Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	147	48	216	117	369	54	691	286	309	581	26
Future Volume (vph)	22	147	48	216	117	369	54	691	286	309	581	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0	5.0	4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	1.00	0.95	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	2006	1863	1555		1804	1794	1770	2111	1510	2006	3986	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	2006	1863	1555		1804	1794	1770	2111	1510	2006	3986	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	160	52	235	127	401	59	751	311	336	632	28
RTOR Reduction (vph)	0	0	47	0	0	179	0	0	108	0	2	0
Lane Group Flow (vph)	24	160	5	0	362	222	59	751	203	336	658	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	14.7	14.7	14.7		27.1	48.8	7.3	66.0	66.0	21.7	80.4	
Effective Green, g (s)	14.7	14.7	14.7		27.1	48.8	7.3	66.0	66.0	21.7	80.4	
Actuated g/C Ratio	0.10	0.10	0.10		0.18	0.33	0.05	0.44	0.44	0.15	0.54	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0	5.0	4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	198	184	153		328	589	86	937	670	292	2156	
v/s Ratio Prot	0.01	c0.09			c0.20	0.12	0.03	c0.36		c0.17	0.17	
v/s Ratio Perm			0.00						0.13			
v/c Ratio	0.12	0.87	0.03		1.10	0.38	0.69	0.80	0.30	1.15	0.31	
Uniform Delay, d1	61.1	66.0	60.5		60.8	38.3	69.5	35.6	26.5	63.4	18.7	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	31.7	0.0		80.5	0.4	16.5	7.2	1.2	99.8	0.1	
Delay (s)	61.2	97.7	60.6		141.3	38.7	86.1	42.8	27.7	163.2	18.8	
Level of Service	E	F	E		F	D	F	D	C	F	B	
Approach Delay (s)		85.8			87.3			40.9			67.5	
Approach LOS		F			F			D			E	

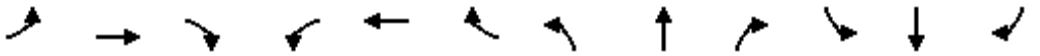
Intersection Summary			
HCM 2000 Control Delay	64.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	148.6	Sum of lost time (s)	19.1
Intersection Capacity Utilization	95.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	801	31	42	770	52	21	0	42	24	13	53
Future Volume (Veh/h)	9	801	31	42	770	52	21	0	42	24	13	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	871	34	46	837	57	23	0	46	26	14	58
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.92			0.92	0.92	0.92	0.92	0.92	
vC, conflicting volume	894			905			1930	1894	888	1912	1882	866
vC1, stage 1 conf vol							908	908		958	958	
vC2, stage 2 conf vol							1022	986		954	925	
vCu, unblocked vol	894			851			1970	1930	832	1949	1917	866
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			94			86	100	86	85	93	84
cM capacity (veh/h)	759			722			168	223	338	169	214	353

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	915	940	69	98
Volume Left	10	46	23	26
Volume Right	34	57	46	58
cSH	759	722	253	256
Volume to Capacity	0.01	0.06	0.27	0.38
Queue Length 95th (ft)	1	5	27	43
Control Delay (s)	0.4	1.8	24.5	27.6
Lane LOS	A	A	C	D
Approach Delay (s)	0.4	1.8	24.5	27.6
Approach LOS			C	D

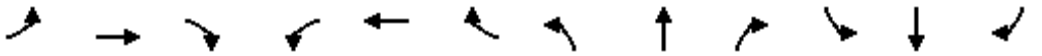
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	1116	26	61	1097	61	5	4	97	24	4	15
Future Volume (Veh/h)	9	1116	26	61	1097	61	5	4	97	24	4	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	1213	28	66	1192	66	5	4	105	26	4	16
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.93			0.93	0.93	0.93	0.93	0.93	
vC, conflicting volume	1258			1242			2591	2638	1228	2697	2619	1226
vC1, stage 1 conf vol							1248	1248		1357	1357	
vC2, stage 2 conf vol							1343	1390		1340	1262	
vCu, unblocked vol	1258			1221			2679	2729	1206	2793	2709	1226
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			87			95	97	49	0	97	93
cM capacity (veh/h)	553			528			108	132	207	18	117	218

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	10	1241	66	1258	114	46
Volume Left	10	0	66	0	5	26
Volume Right	0	28	0	66	105	16
cSH	553	1700	528	1700	195	29
Volume to Capacity	0.02	0.73	0.13	0.74	0.58	1.58
Queue Length 95th (ft)	1	0	11	0	80	134
Control Delay (s)	11.6	0.0	12.8	0.0	46.5	585.5
Lane LOS	B		B		E	F
Approach Delay (s)	0.1		0.6		46.5	585.5
Approach LOS					E	F

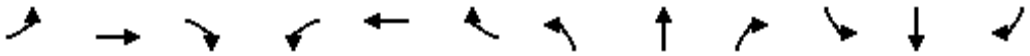
Intersection Summary				
Average Delay	12.1			
Intersection Capacity Utilization	77.2%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	1215	0	0	1250	329	0	0	0	0	0	22
Future Volume (Veh/h)	13	1215	0	0	1250	329	0	0	0	0	0	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	1321	0	0	1359	358	0	0	0	0	0	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1717			1321			2732	3066	1321	2887	2887	1538
vC1, stage 1 conf vol							1349	1349		1538	1538	
vC2, stage 2 conf vol							1383	1717		1349	1349	
vCu, unblocked vol	1717			1321			2732	3066	1321	2887	2887	1538
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	100	100	83
cM capacity (veh/h)	369			523			102	106	191	107	130	142

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	14	1321	0	1717	0	24
Volume Left	14	0	0	0	0	0
Volume Right	0	0	0	358	0	24
cSH	369	1700	1700	1700	1700	142
Volume to Capacity	0.04	0.78	0.00	1.01	0.00	0.17
Queue Length 95th (ft)	3	0	0	0	0	15
Control Delay (s)	15.2	0.0	0.0	0.0	0.0	35.3
Lane LOS	C				A	E
Approach Delay (s)	0.2		0.0		0.0	35.3
Approach LOS					A	E

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	95.8%	ICU Level of Service		F
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	83	0	0	104	87	878	23	104	704	8
Future Volume (Veh/h)	0	0	83	0	0	104	87	878	23	104	704	8
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	90	0	0	113	95	954	25	113	765	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	2252	2164	770	2238	2156	966	774			979		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2252	2164	770	2238	2156	966	774			979		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	78	100	100	63	89			84		
cM capacity (veh/h)	15	35	401	19	36	309	842			705		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	90	113	95	979	113	774
Volume Left	0	0	95	0	113	0
Volume Right	90	113	0	25	0	9
cSH	401	309	842	1700	705	1700
Volume to Capacity	0.22	0.37	0.11	0.58	0.16	0.46
Queue Length 95th (ft)	21	41	10	0	14	0
Control Delay (s)	16.6	23.3	9.8	0.0	11.1	0.0
Lane LOS	C	C	A		B	
Approach Delay (s)	16.6	23.3	0.9		1.4	
Approach LOS	C	C				

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	60.7%	ICU Level of Service		B
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	185	91	77	0	52	12	25	0	25	557	44	0	19	557	47
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	205	101	85	0	58	13	28	0	28	618	49	0	21	618	52
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		391			99			695			691	
Entry Volume veh/h		383			97			681			677	
Circulating Flow (Vc), pc/h	697			851			327			99		
Exiting Flow (Vex), pc/h	171			93			851			761		
Capacity (cPCE), pc/h		563			483			815			1024	
Capacity (c), veh/h		552			473			799			1003	
v/c Ratio (X)		0.69			0.21			0.85			0.68	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.5			10.6			28.8			14.1	
Lane LOS		C			B			D			B	
95% Queue		5.4			0.8			10.2			5.5	
Approach Delay, s/veh	23.5			10.6			28.8			14.1		
Approach LOS	C			B			D			B		
Intersection Delay, s/veh / LOS	21.3						C					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - West
E/W Street Name	West Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	34	20	29	0	37	20	43	0	29	246	37	0	43	245	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	38	22	32	0	41	22	48	0	32	273	41	0	48	272	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		92			111			346			358	
Entry Volume veh/h		90			109			339			351	
Circulating Flow (Vc), pc/h	361			343			108			95		
Exiting Flow (Vex), pc/h	111			92			359			345		
Capacity (cPCE), pc/h		788			802			1014			1028	
Capacity (c), veh/h		772			786			994			1007	
v/c Ratio (X)		0.12			0.14			0.34			0.35	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.9			6.0			7.2			7.2	
Lane LOS		A			A			A			A	
95% Queue		0.4			0.5			1.5			1.6	
Approach Delay, s/veh	5.9			6.0			7.2			7.2		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.9						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Kelly Street
E/W Street Name	Kelly Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	39	16	13	0	8	6	151	0	3	315	8	0	141	305	59
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	43	18	14	0	9	7	167	0	3	349	9	0	156	338	65
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		75			183			361			559	
Entry Volume veh/h		74			179			354			548	
Circulating Flow (Vc), pc/h	503			395			217			19		
Exiting Flow (Vex), pc/h	183			75			559			361		
Capacity (cPCE), pc/h		683			761			910			1109	
Capacity (c), veh/h		670			746			892			1087	
v/c Ratio (X)		0.11			0.24			0.40			0.50	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.6			7.5			8.7			9.2	
Lane LOS		A			A			A			A	
95% Queue		0.4			0.9			1.9			2.9	
Approach Delay, s/veh	6.6			7.5			8.7			9.2		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	8.6						A					

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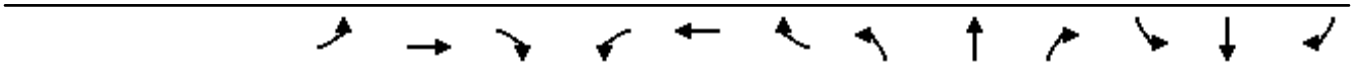


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Future Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				112	0	0	14	1151	0	26	2405	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				738	0	329	92	3173	988	92	2208	988
Arrive On Green				0.20	0.00	0.00	0.05	0.60	0.00	0.05	0.60	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				112	0	0	14	1151	0	26	2405	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Cycle Q Clear(g_c), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				738	0	329	92	3173	988	92	2208	988
V/C Ratio(X)				0.15	0.00	0.00	0.15	0.36	0.00	0.28	1.09	0.00
Avail Cap(c_a), veh/h				738	0	329	92	3173	988	92	2208	988
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				26.4	0.0	0.0	36.4	8.2	0.0	36.6	16.0	0.0
Incr Delay (d2), s/veh				0.4	0.0	0.0	3.5	0.3	0.0	7.5	48.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.0	0.4	4.4	0.0	0.7	38.7	0.0
LnGrp Delay(d),s/veh				26.8	0.0	0.0	39.8	8.5	0.0	44.1	64.3	0.0
LnGrp LOS				C			D	A		D	F	
Approach Vol, veh/h					112			1165			2431	
Approach Delay, s/veh					26.8			8.9			64.1	
Approach LOS					C			A			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	52.0			8.0	52.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	48.0			4.0	48.0		16.0
Max Q Clear Time (g_c+I1), s	3.1	10.9			2.6	50.0		4.0
Green Ext Time (p_c), s	0.0	10.6			0.0	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1123	209	317	1287	0	0
Future Volume (veh/h)	1123	209	317	1287	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	1221	227	345	1399		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	2116	947	805	3313		
Arrive On Green	0.57	0.57	0.22	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	1221	227	345	1399		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	8.4	2.7	3.3	2.5		
Cycle Q Clear(g_c), s	8.4	2.7	3.3	2.5		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2116	947	805	3313		
V/C Ratio(X)	0.58	0.24	0.43	0.42		
Avail Cap(c_a), veh/h	2116	947	805	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.4	4.2	13.3	0.3		
Incr Delay (d2), s/veh	1.2	0.6	1.7	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.4	1.4	1.8	1.2		
LnGrp Delay(d),s/veh	6.6	4.8	15.0	0.7		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1448			1744		
Approach Delay, s/veh	6.3			3.5		
Approach LOS	A			A		

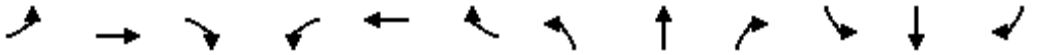
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			13.0	27.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			9.0	23.0				36.0
Max Q Clear Time (g_c+I1), s			5.3	10.4				4.5
Green Ext Time (p_c), s			0.5	7.5				13.7

Intersection Summary	
HCM 2010 Ctrl Delay	4.8
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1740	97	305	1324	156	0
Future Volume (veh/h)	1740	97	305	1324	156	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1891	105	332	1439	170	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1840	823	358	2419	422	376
Arrive On Green	0.50	0.50	0.10	0.66	0.23	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	1891	105	332	1439	170	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	35.0	2.4	6.4	15.4	5.5	0.0
Cycle Q Clear(g_c), s	35.0	2.4	6.4	15.4	5.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1840	823	358	2419	422	376
V/C Ratio(X)	1.03	0.13	0.93	0.59	0.40	0.00
Avail Cap(c_a), veh/h	1840	823	358	2419	422	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.5	9.3	31.2	6.8	22.9	0.0
Incr Delay (d2), s/veh	28.3	0.3	32.3	1.1	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	24.9	1.2	4.8	8.0	3.1	0.0
LnGrp Delay(d),s/veh	45.8	9.7	63.6	7.8	25.8	0.0
LnGrp LOS	F	A	E	A	C	
Approach Vol, veh/h	1996			1771	170	
Approach Delay, s/veh	43.9			18.3	25.8	
Approach LOS	D			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	11.0	39.0				50.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	7.0	35.0				46.0
Max Q Clear Time (g_c+I1), s		7.5	8.4	37.0				17.4
Green Ext Time (p_c), s		0.3	0.0	0.0				13.6

Intersection Summary	
HCM 2010 Ctrl Delay	31.6
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Future Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	680	7	89	633	0	5	0	34	90	0	53
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1244	13	217	1949	872	0	0	0	1158	0	517
Arrive On Green	0.00	0.33	0.33	0.12	0.53	0.00	0.00	0.00	0.00	0.31	0.00	0.31
Sat Flow, veh/h	0	3829	38	1845	3681	1647		0		3690	0	1647
Grp Volume(v), veh/h	0	335	352	89	633	0		0.0		90	0	53
Grp Sat Flow(s),veh/h/ln	0	1840	1930	1845	1840	1647				1845	0	1647
Q Serve(g_s), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Cycle Q Clear(g_c), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	613	643	217	1949	872				1158	0	517
V/C Ratio(X)	0.00	0.55	0.55	0.41	0.32	0.00				0.08	0.00	0.10
Avail Cap(c_a), veh/h	0	613	643	217	1949	872				1158	0	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.9	13.9	20.9	6.8	0.0				12.3	0.0	12.4
Incr Delay (d2), s/veh	0.0	3.5	3.3	5.6	0.4	0.0				0.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.4	4.6	1.5	2.6	0.0				0.5	0.0	0.6
LnGrp Delay(d),s/veh	0.0	17.3	17.2	26.5	7.3	0.0				12.4	0.0	12.8
LnGrp LOS		B	B	C	A					B		B
Approach Vol, veh/h		687			722						143	
Approach Delay, s/veh		17.3			9.6						12.6	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			10.0	21.0		20.0		31.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			6.0	17.0		16.0		27.0
Max Q Clear Time (g_c+I1), s			4.3	9.6		3.2		7.0
Green Ext Time (p_c), s			0.0	2.5		0.3		4.3

Intersection Summary	
HCM 2010 Ctrl Delay	13.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Future Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	195	751	10	30	1102	325	10	2	16	202	169	79
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	1209	16	115	1058	473	329	66	350	369	250	117
Arrive On Green	0.10	0.32	0.32	0.06	0.29	0.29	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1845	3719	50	1845	3681	1647	1550	310	1647	1845	1250	584
Grp Volume(v), veh/h	195	372	389	30	1102	325	12	0	16	202	0	248
Grp Sat Flow(s),veh/h/ln	1845	1840	1929	1845	1840	1647	1860	0	1647	1845	0	1834
Q Serve(g_s), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Cycle Q Clear(g_c), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Prop In Lane	1.00		0.03	1.00		1.00	0.83		1.00	1.00		0.32
Lane Grp Cap(c), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
V/C Ratio(X)	1.06	0.62	0.62	0.26	1.04	0.69	0.03	0.00	0.05	0.55	0.00	0.68
Avail Cap(c_a), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	22.8	22.8	35.7	28.5	25.3	25.0	0.0	25.0	28.7	0.0	29.6
Incr Delay (d2), s/veh	82.1	4.8	4.6	5.4	39.0	7.9	0.1	0.0	0.2	5.7	0.0	9.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	7.7	8.0	0.8	17.3	7.4	0.2	0.0	0.3	4.6	0.0	6.0
LnGrp Delay(d),s/veh	118.1	27.6	27.4	41.1	67.5	33.2	25.1	0.0	25.3	34.5	0.0	39.2
LnGrp LOS	F	C	C	D	F	C	C		C	C		D
Approach Vol, veh/h		956			1457			28			450	
Approach Delay, s/veh		46.0			59.3			25.2			37.1	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	30.0		20.0	12.0	27.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	26.0		16.0	8.0	23.0
Max Q Clear Time (g_c+I1), s		2.6	3.2	15.7		12.0	10.0	25.0
Green Ext Time (p_c), s		0.0	0.0	3.5		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	51.1
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Future Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	838	272	98	1080	483	394	413	351	394	413	351
Arrive On Green	0.07	0.31	0.31	0.05	0.29	0.29	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1845	2732	888	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	66	634	617	96	832	201	250	306	153	368	411	424
Grp Sat Flow(s),veh/h/ln	1845	1840	1780	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Cycle Q Clear(g_c), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Prop In Lane	1.00		0.50	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
V/C Ratio(X)	0.54	1.12	1.13	0.98	0.77	0.42	0.64	0.74	0.44	0.93	0.99	1.21
Avail Cap(c_a), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.9	26.0	26.0	35.5	24.2	21.3	26.8	27.6	25.6	29.0	29.5	29.5
Incr Delay (d2), s/veh	15.8	76.4	79.7	84.3	5.3	2.6	7.6	11.3	3.9	31.6	42.9	116.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	23.6	23.3	4.3	8.7	3.7	5.6	7.2	3.1	10.9	13.4	18.6
LnGrp Delay(d),s/veh	49.6	102.4	105.7	119.7	29.5	24.0	34.5	38.9	29.5	60.6	72.4	146.4
LnGrp LOS	D	F	F	F	C	C	C	D	C	E	E	F
Approach Vol, veh/h		1317			1129			709			1203	
Approach Delay, s/veh		101.3			36.2			35.3			94.9	
Approach LOS		F			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	27.0		20.0	9.0	26.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	23.0		16.0	5.0	22.0
Max Q Clear Time (g_c+I1), s		13.1	5.9	25.0		18.0	4.6	17.5
Green Ext Time (p_c), s		1.0	0.0	0.0		0.0	0.0	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	71.9
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Future Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	85	8	8	93	10	4	5	9	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	24%	21%	7%
Vol Thru, %	29%	72%	84%
Vol Right, %	47%	6%	9%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	17	108	102
LT Vol	4	23	7
Through Vol	5	78	86
RT Vol	8	7	9
Lane Flow Rate	18	117	111
Geometry Grp	1	1	1
Degree of Util (X)	0.021	0.132	0.124
Departure Headway (Hd)	4.088	4.052	4.014
Convergence, Y/N	Yes	Yes	Yes
Cap	860	884	891
Service Time	2.187	2.083	2.047
HCM Lane V/C Ratio	0.021	0.132	0.125
HCM Control Delay	7.3	7.7	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.4

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Future Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	212	60	34	38	0	0	0	0	30	0	50

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	212	0	0			318	318	38
Stage 1	-	-	-	-	-	-			106	106	-
Stage 2	-	-	-	-	-	-			212	212	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1358	-	0			675	598	1034
Stage 1	0	-	-	-	-	0			918	807	-
Stage 2	0	-	-	-	-	0			823	727	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1358	-	-			657	0	1034
Mov Cap-2 Maneuver	-	-	-	-	-	-			657	0	-
Stage 1	-	-	-	-	-	-			894	0	-
Stage 2	-	-	-	-	-	-			823	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	3.6	9.5
HCM LOS			A

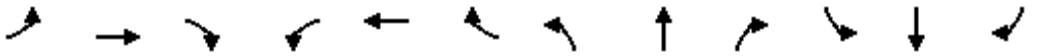
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1358	-	657	1034
HCM Lane V/C Ratio	-	-	0.025	-	0.046	0.048
HCM Control Delay (s)	-	-	7.7	0	10.7	8.7
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	945	137	935	1632	56	1428
Future Volume (veh/h)	945	137	935	1632	56	1428
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1027	0	1016	1774	61	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1302	583	1211	1401	397	624
Arrive On Green	0.35	0.00	0.34	0.72	0.22	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	1027	0	1016	1774	61	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	32.5	0.0	34.1	94.0	3.5	0.0
Cycle Q Clear(g_c), s	32.5	0.0	34.1	94.0	3.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1302	583	1211	1401	397	624
V/C Ratio(X)	0.79	0.00	0.84	1.27	0.15	0.00
Avail Cap(c_a), veh/h	1302	583	1211	1401	397	624
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.6	0.0	39.7	18.0	41.4	0.0
Incr Delay (d2), s/veh	4.9	0.0	7.0	125.7	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.4	0.0	18.0	98.3	1.9	0.0
LnGrp Delay(d),s/veh	42.5	0.0	46.8	143.7	42.2	0.0
LnGrp LOS	D		D	F	D	
Approach Vol, veh/h	1027			2790	61	
Approach Delay, s/veh	42.5			108.4	42.2	
Approach LOS	D			F	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		32.0	48.0	50.0				98.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		28.0	44.0	46.0				94.0
Max Q Clear Time (g_c+I1), s		5.5	36.1	34.5				96.0
Green Ext Time (p_c), s		0.1	2.8	5.5				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	89.9
HCM 2010 LOS	F

Appendix J.2 – Analysis Output Sheets (Future with Project Existing SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	81	61	94	302	563	169	18	141	82	23	69
Future Volume (vph)	89	81	61	94	302	563	169	18	141	82	23	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3145	1441		1782	1583		1793	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3145	1441		1782	1583		1793	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	88	66	102	328	612	184	20	153	89	25	75
RTOR Reduction (vph)	0	0	58	0	226	253	0	0	91	0	0	57
Lane Group Flow (vph)	97	88	8	102	408	53	0	204	62	0	114	18
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Effective Green, g (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Actuated g/C Ratio	0.07	0.11	0.11	0.11	0.17	0.17		0.29	0.29		0.23	0.23
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	132	212	180	199	546	250		518	460		419	369
v/s Ratio Prot	0.05	0.05		c0.06	c0.13			c0.11			c0.06	
v/s Ratio Perm			0.00			0.04			0.04			0.01
v/c Ratio	0.73	0.42	0.04	0.51	0.75	0.21		0.39	0.13		0.27	0.05
Uniform Delay, d1	33.3	30.3	29.0	30.7	28.9	26.1		20.9	19.3		23.1	21.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	19.0	0.5	0.0	2.2	4.9	0.2		2.2	0.6		1.6	0.2
Delay (s)	52.3	30.8	29.1	33.0	33.8	26.2		23.1	19.9		24.7	22.1
Level of Service	D	C	C	C	C	C		C	B		C	C
Approach Delay (s)		38.7			31.5			21.7			23.7	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	18.3
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	409	0	381	0	0	179	464	0	121	166	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	0	0	0	0	453	0	414	0	0	198	514	0	134	184	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929		4.6453	4.3276			4.3276		4.6453	4.3276	
Follow-Up Headway (s)		3.1858		2.6667	2.5352			2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		0		0	453	414		198	514	134	184	
Entry Volume veh/h		0		0	444	414		194	504	131	180	
Circulating Flow (v_c), pc/h	771			198			134			453		
Exiting Flow (v_{ex}), pc/h	134			0			198			637		
Capacity (c_{pce}), pc/h		523		1125	1200			1267		890	966	
Capacity (c), veh/h		512		1103	1177			1242		872	947	
v/c Ratio (x)		0.00		0.00	0.38			0.16		0.15	0.19	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.0		3.3	6.8	0.0		4.2	0.0	5.6	5.6	
Lane LOS		A		A	A	A		A	A	A	A	
95% Queue, veh		0.0		0.0	1.8			0.6		0.5	0.7	
Approach Delay, s/veh				3.5			1.2			5.6		
Approach LOS				A			A			A		
Intersection Delay, s/veh | LOS	3.0						A					

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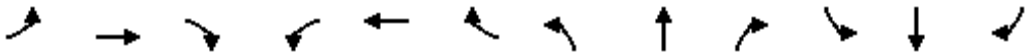

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	21	4	43	27	84	12	58	62	125	79	6
Future Volume (vph)	2	21	4	43	27	84	12	58	62	125	79	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	23	4	47	29	91	13	63	67	136	86	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	29	167	143	229
Volume Left (vph)	2	47	13	136
Volume Right (vph)	4	91	67	7
Hadj (s)	-0.03	-0.24	-0.23	0.13
Departure Headway (s)	5.0	4.6	4.4	4.7
Degree Utilization, x	0.04	0.21	0.18	0.30
Capacity (veh/h)	650	726	767	732
Control Delay (s)	8.2	8.8	8.4	9.7
Approach Delay (s)	8.2	8.8	8.4	9.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	40.4%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Surfrider Way
E/W Street Name	Surfrider Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1
Lane Assignment			LTR				LTR				LTR		LT		R	
Volume (V), veh/h	0	11	8	17	0	2	13	3	0	13	331	2	0	2	360	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	12	9	19	0	2	14	3	0	14	367	2	0	2	399	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929		4.5436	4.5436	
Follow-Up Headway (s)		3.1858			3.1858			3.1858		2.5352	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		40			19			383		401	38	
Entry Volume veh/h		39			19			375		393	37	
Circulating Flow (v_c), pc/h	403			393			23			30		
Exiting Flow (v_{ex}), pc/h	13			66			382			420		
Capacity (c_{pce}), pc/h		755			763			1104		1382	1382	
Capacity (c), veh/h		740			748			1083		1355	1355	
v/c Ratio (x)		0.05			0.02			0.35		0.29	0.03	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.4			5.1			6.8		5.2	2.9	
Lane LOS		A			A			A		A	A	
95% Queue, veh		0.2			0.1			1.6		1.2	0.1	
Approach Delay, s/veh	5.4			5.1			6.8			5.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.8						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Civic Center Drive
Agency or Co.	IBI Group	E/W Street Name	Civic Center Drive
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	12	9	8	0	22	13	21	0	7	280	27	0	60	333	12
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	13	10	9	0	24	14	23	0	8	310	30	0	67	369	13
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		32			61			348			449	
Entry Volume veh/h		31			60			341			440	
Circulating Flow (v_c), pc/h	460			331			90			46		
Exiting Flow (v_{ex}), pc/h	107			35			346			402		
Capacity (c_{pce}), pc/h		713			812			1033			1079	
Capacity (c), veh/h		699			796			1013			1058	
v/c Ratio (x)		0.04			0.08			0.34			0.42	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.6			5.3			7.0			7.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.1			0.2			1.5			2.1	
Approach Delay, s/veh	5.6			5.3			7.0			7.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.3						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Pier View Way
Agency or Co.	IBI Group	E/W Street Name	Pier View Way
Date Performed	7/11/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	11	8	17	0	2	13	3	0	13	331	2	0	2	360	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	12	9	19	0	2	14	3	0	14	367	2	0	2	399	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		40			19			383			439	
Entry Volume veh/h		39			19			375			430	
Circulating Flow (v_c), pc/h	403			393			23			30		
Exiting Flow (v_{ex}), pc/h	13			66			382			420		
Capacity (c_{pce}), pc/h		755			763			1104			1097	
Capacity (c), veh/h		740			748			1083			1075	
v/c Ratio (x)		0.05			0.02			0.35			0.40	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.4			5.1			6.8			7.6	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.1			1.6			2.0	
Approach Delay, s/veh	5.4			5.1			6.8			7.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.1						A					

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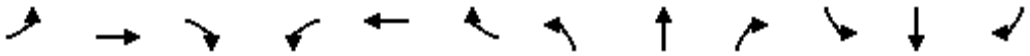
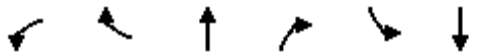


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	3	19	9	6	4	89	222	3	5	152	7
Future Volume (vph)	2	3	19	9	6	4	89	222	3	5	152	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	3	21	10	7	4	97	241	3	5	165	8

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	5	21	21	218	124	88	91
Volume Left (vph)	2	0	10	97	0	5	0
Volume Right (vph)	0	21	4	0	3	0	8
Hadj (s)	0.23	-0.67	0.01	0.26	0.02	0.06	-0.03
Departure Headway (s)	5.9	5.0	5.7	5.0	4.8	5.0	4.9
Degree Utilization, x	0.01	0.03	0.03	0.30	0.16	0.12	0.12
Capacity (veh/h)	559	655	585	703	735	701	717
Control Delay (s)	7.8	7.0	8.9	9.0	7.5	7.5	7.4
Approach Delay (s)	7.1		8.9	8.5		7.4	
Approach LOS	A		A	A		A	

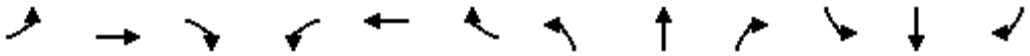
Intersection Summary				
Delay	8.1			
Level of Service	A			
Intersection Capacity Utilization	31.1%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	125	57	130	88	33	114
Future Volume (vph)	125	57	130	88	33	114
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	136	62	141	96	36	124

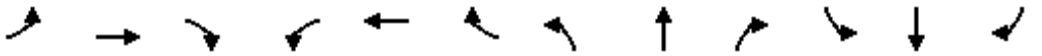
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	136	62	237	160
Volume Left (vph)	136	0	0	36
Volume Right (vph)	0	62	96	0
Hadj (s)	0.53	-0.67	-0.21	0.08
Departure Headway (s)	6.0	4.8	4.4	4.8
Degree Utilization, x	0.23	0.08	0.29	0.21
Capacity (veh/h)	568	706	777	710
Control Delay (s)	9.5	7.0	9.3	9.1
Approach Delay (s)	8.7		9.3	9.1
Approach LOS	A		A	A

Intersection Summary			
Delay	9.0		
Level of Service	A		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		



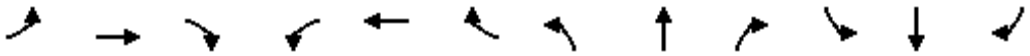
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	123	35	160	32	0	0	0	0	30	40
Future Volume (vph)	18	0	123	35	160	32	0	0	0	0	30	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.92	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3450						3239	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3450						3239	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	0	134	38	174	35	0	0	0	0	33	43
RTOR Reduction (vph)	0	0	125	16	15	0	0	0	0	0	40	0
Lane Group Flow (vph)	20	0	9	22	194	0	0	0	0	0	36	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	3.4		3.4	29.2	29.2						3.9	
Effective Green, g (s)	3.4		3.4	29.2	29.2						3.9	
Actuated g/C Ratio	0.07		0.07	0.58	0.58						0.08	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	120		189	1033	2014						252	
v/s Ratio Prot	c0.01		0.00	0.01	c0.06						c0.01	
v/s Ratio Perm												
v/c Ratio	0.17		0.05	0.02	0.10						0.14	
Uniform Delay, d1	22.0		21.8	4.4	4.6						21.5	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.7		0.1	0.0	0.1						0.3	
Delay (s)	22.6		21.9	4.4	4.7						21.8	
Level of Service	C		C	A	A						C	
Approach Delay (s)		22.0			4.6			0.0			21.8	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	139	226	72	69	507	0	0	289	32
Future Volume (vph)	0	0	0	139	226	72	69	507	0	0	289	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1526	1770	1863			1766	1461
Flt Permitted				0.95	1.00	1.00	0.43	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1526	796	1863			1766	1461
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	151	246	78	75	551	0	0	314	35
RTOR Reduction (vph)	0	0	0	0	0	54	0	0	0	0	1	23
Lane Group Flow (vph)	0	0	0	151	246	24	75	551	0	0	317	8
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.1	18.1	18.1	30.8	30.8			15.7	15.7
Effective Green, g (s)				18.1	18.1	18.1	30.8	30.8			15.7	15.7
Actuated g/C Ratio				0.31	0.31	0.31	0.52	0.52			0.27	0.27
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				543	1087	468	583	974			470	389
v/s Ratio Prot				c0.09	0.07		0.02	c0.30			c0.18	
v/s Ratio Perm						0.02	0.05					0.01
v/c Ratio				0.28	0.23	0.05	0.13	0.57			0.68	0.02
Uniform Delay, d1				15.5	15.2	14.4	9.9	9.5			19.3	15.9
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				1.3	0.5	0.2	0.1	0.9			4.2	0.0
Delay (s)				16.7	15.7	14.6	10.1	10.4			23.5	16.0
Level of Service				B	B	B	B	B			C	B
Approach Delay (s)		0.0			15.8			10.4			22.8	
Approach LOS		A			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	111	1	123	416	202	11	24	185	135	47	6
Future Volume (vph)	23	111	1	123	416	202	11	24	185	135	47	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3535		1770	3539	1583		1834	1583	1681	1714	
Flt Permitted	0.45	1.00		0.67	1.00	1.00		0.94	1.00	0.73	0.90	
Satd. Flow (perm)	846	3535		1257	3539	1583		1752	1583	1296	1570	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	121	1	134	452	220	12	26	201	147	51	7
RTOR Reduction (vph)	0	1	0	0	0	161	0	0	89	0	3	0
Lane Group Flow (vph)	25	121	0	134	452	59	0	38	112	101	101	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	15.1	15.1		14.7	14.7	14.7		30.7	30.7	30.7	30.7	
Effective Green, g (s)	15.1	15.1		14.7	14.7	14.7		30.7	30.7	30.7	30.7	
Actuated g/C Ratio	0.27	0.27		0.27	0.27	0.27		0.56	0.56	0.56	0.56	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	232	970		335	945	423		977	883	723	876	
v/s Ratio Prot		0.03			c0.13							
v/s Ratio Perm	0.03			0.11		0.04		0.02	0.07	c0.08	0.06	
v/c Ratio	0.11	0.13		0.40	0.48	0.14		0.04	0.13	0.14	0.12	
Uniform Delay, d1	14.9	15.0		16.5	16.9	15.3		5.5	5.8	5.8	5.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.1		0.9	0.5	0.2		0.1	0.3	0.4	0.3	
Delay (s)	15.2	15.1		17.5	17.4	15.5		5.6	6.1	6.2	6.0	
Level of Service	B	B		B	B	B		A	A	A	A	
Approach Delay (s)		15.1			16.9			6.0			6.1	
Approach LOS		B			B			A			A	

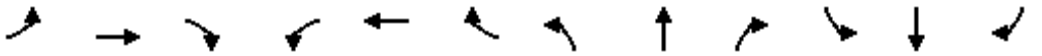
Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	78	6	22	28	6	9
Future Volume (Veh/h)	78	6	22	28	6	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	85	7	24	30	7	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			92		166	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			92		166	88
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	99
cM capacity (veh/h)			1503		811	970

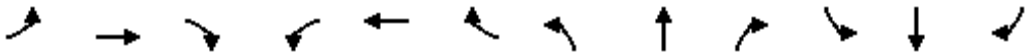
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	92	54	17
Volume Left	0	24	7
Volume Right	7	0	10
cSH	1700	1503	897
Volume to Capacity	0.05	0.02	0.02
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	3.4	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	3.4	9.1
Approach LOS			A

Intersection Summary			
Average Delay		2.1	
Intersection Capacity Utilization		19.4%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	53	99	0	0	0	28	215	58	68	208	55
Future Volume (vph)	93	53	99	0	0	0	28	215	58	68	208	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.95				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1498				1770	1863	1552	1770	1863	1518
Flt Permitted	0.95	1.00	1.00				0.62	1.00	1.00	0.45	1.00	1.00
Satd. Flow (perm)	1770	1863	1498				1150	1863	1552	831	1863	1518
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	58	108	0	0	0	30	234	63	74	226	60
RTOR Reduction (vph)	0	0	60	0	0	0	0	0	45	0	0	36
Lane Group Flow (vph)	101	58	48	0	0	0	30	234	18	74	226	24
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	24.3	24.3	24.3				15.5	15.5	15.5	21.9	21.9	21.9
Effective Green, g (s)	24.3	24.3	24.3				15.5	15.5	15.5	21.9	21.9	21.9
Actuated g/C Ratio	0.44	0.44	0.44				0.28	0.28	0.28	0.40	0.40	0.40
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	782	823	661				324	525	437	371	741	604
v/s Ratio Prot	c0.06	0.03						c0.13		0.01	c0.12	
v/s Ratio Perm			0.03				0.03		0.01	0.07		0.02
v/c Ratio	0.13	0.07	0.07				0.09	0.45	0.04	0.20	0.30	0.04
Uniform Delay, d1	9.1	8.8	8.9				14.6	16.2	14.3	10.7	11.3	10.1
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	0.2				0.6	2.7	0.2	0.3	1.1	0.1
Delay (s)	9.4	9.0	9.1				15.1	18.9	14.5	10.9	12.4	10.2
Level of Service	A	A	A				B	B	B	B	B	B
Approach Delay (s)		9.2			0.0			17.7			11.7	
Approach LOS		A			A			B			B	

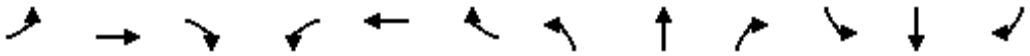
Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	188	9	0	0	0	0	4	16	21	8	0
Future Volume (Veh/h)	11	188	9	0	0	0	0	4	16	21	8	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	204	10	0	0	0	0	4	17	23	9	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			214			238	233	107	145	238	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			214			238	233	107	145	238	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	98	97	99	100
cM capacity (veh/h)	1622			1353			686	661	926	787	657	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	114	112	21	32
Volume Left	12	0	0	23
Volume Right	0	10	17	0
cSH	1622	1700	861	745
Volume to Capacity	0.01	0.07	0.02	0.04
Queue Length 95th (ft)	1	0	2	3
Control Delay (s)	0.8	0.0	9.3	10.0
Lane LOS	A		A	B
Approach Delay (s)	0.4		9.3	10.0
Approach LOS			A	B

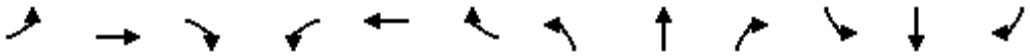
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	20.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	23	425	4	0	0	0	0	4	20	14	13	0
Future Volume (vph)	23	425	4	0	0	0	0	4	20	14	13	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	462	4	0	0	0	0	4	22	15	14	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	256	235	26	29
Volume Left (vph)	25	0	0	15
Volume Right (vph)	0	4	22	0
Hadj (s)	0.08	0.02	-0.47	0.14
Departure Headway (s)	4.7	4.7	4.5	5.1
Degree Utilization, x	0.34	0.30	0.03	0.04
Capacity (veh/h)	754	760	744	656
Control Delay (s)	8.9	8.5	7.6	8.3
Approach Delay (s)	8.7		7.6	8.3
Approach LOS	A		A	A

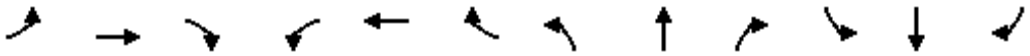
Intersection Summary				
Delay	8.6			
Level of Service	A			
Intersection Capacity Utilization	27.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	90	171	9	39	0	91	0	45	29	0	0	0
Future Volume (vph)	90	171	9	39	0	91	0	45	29	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	186	10	42	0	99	0	49	32	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	98	196	141	81
Volume Left (vph)	98	0	42	0
Volume Right (vph)	0	10	99	32
Hadj (s)	0.53	0.00	-0.33	-0.20
Departure Headway (s)	5.3	4.8	4.2	4.7
Degree Utilization, x	0.15	0.26	0.16	0.10
Capacity (veh/h)	662	732	826	716
Control Delay (s)	8.0	8.3	8.0	8.2
Approach Delay (s)	8.2		8.0	8.2
Approach LOS	A		A	A

Intersection Summary				
Delay	8.2			
Level of Service	A			
Intersection Capacity Utilization	31.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	13	0	0	31	13	235	20	14	243	6
Future Volume (Veh/h)	0	0	13	0	0	31	13	235	20	14	243	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	14	0	0	34	14	255	22	15	264	7
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked												
vC, conflicting volume	622	616	274	609	609	273	278			284		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	622	616	274	609	609	273	278			284		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	96	99			99		
cM capacity (veh/h)	369	391	760	386	395	760	1277			1268		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	14	34	14	277	15	271
Volume Left	0	0	14	0	15	0
Volume Right	14	34	0	22	0	7
cSH	760	760	1277	1700	1268	1700
Volume to Capacity	0.02	0.04	0.01	0.16	0.01	0.16
Queue Length 95th (ft)	1	4	1	0	1	0
Control Delay (s)	9.8	10.0	7.8	0.0	7.9	0.0
Lane LOS	A	A	A		A	
Approach Delay (s)	9.8	10.0	0.4		0.4	
Approach LOS	A	A				

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	23.6%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Washington Avenue
Agency or Co.	IBI Group	E/W Street Name	Washington Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	2	25	0	37	6	4	0	18	241	11	0	3	251	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	16	2	28	0	41	7	4	0	20	267	12	0	3	278	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		46			52			299			301	
Entry Volume veh/h		45			51			293			295	
Circulating Flow (v_c), pc/h	322			303			21			68		
Exiting Flow (v_{ex}), pc/h	17			47			287			347		
Capacity (c_{pce}), pc/h		819			835			1107			1056	
Capacity (c), veh/h		803			818			1085			1035	
v/c Ratio (x)		0.06			0.06			0.27			0.29	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.0			5.0			5.9			6.3	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.2			1.1			1.2	
Approach Delay, s/veh	5.0			5.0			5.9			6.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.9						A					

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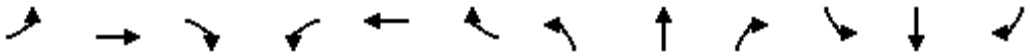
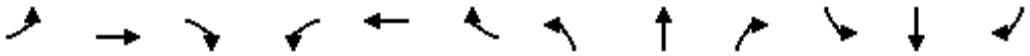


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	22	29	18	26	4	80	3	152	41	95	104	1
Future Volume (vph)	22	29	18	26	4	80	3	152	41	95	104	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	32	20	28	4	87	3	165	45	103	113	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	76	119	213	217
Volume Left (vph)	24	28	3	103
Volume Right (vph)	20	87	45	1
Hadj (s)	-0.06	-0.36	-0.09	0.13
Departure Headway (s)	5.0	4.7	4.6	4.8
Degree Utilization, x	0.11	0.15	0.27	0.29
Capacity (veh/h)	642	695	748	715
Control Delay (s)	8.6	8.5	9.3	9.7
Approach Delay (s)	8.6	8.5	9.3	9.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.2			
Level of Service	A			
Intersection Capacity Utilization	39.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	204	24	5	94	16	12	26	30	22	36	12
Future Volume (Veh/h)	8	204	24	5	94	16	12	26	30	22	36	12
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	222	26	5	102	17	13	28	33	24	39	13
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	133			255			414	403	242	434	408	126
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	133			255			414	403	242	434	408	126
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			97	95	96	95	92	99
cM capacity (veh/h)	1435			1302			496	522	792	473	519	913

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	257	124	74	76
Volume Left	9	5	13	24
Volume Right	26	17	33	13
cSH	1435	1302	609	542
Volume to Capacity	0.01	0.00	0.12	0.14
Queue Length 95th (ft)	0	0	10	12
Control Delay (s)	0.3	0.3	11.7	12.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	11.7	12.7
Approach LOS			B	B

Intersection Summary				
Average Delay	3.7			
Intersection Capacity Utilization	28.7%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	53	53	134	0	87	28	27	0	65	251	62	0	16	276	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	59	59	149	0	96	31	30	0	72	278	69	0	18	306	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		267			157			419			344	
Entry Volume veh/h		262			154			411			337	
Circulating Flow (v_c), pc/h		420			409			136			199	
Exiting Flow (v_{ex}), pc/h		146			123			367			551	
Capacity (c_{pce}), pc/h		742			751			986			926	
Capacity (c), veh/h		728			736			967			908	
v/c Ratio (x)		0.36			0.21			0.42			0.37	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.5			7.2			8.6			8.1	
Lane LOS		A			A			A			A	
95% Queue, veh		1.6			0.8			2.1			1.7	
Approach Delay, s/veh	9.5			7.2			8.6			8.1		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.5						A					

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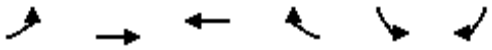
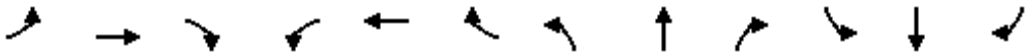


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	208	201	5	16	15
Future Volume (Veh/h)	8	208	201	5	16	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	226	218	5	17	16
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	231				474	230
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	231				474	230
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	98
cM capacity (veh/h)	1328				542	804

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	235	223	33
Volume Left	9	0	17
Volume Right	0	5	16
cSH	1328	1700	643
Volume to Capacity	0.01	0.13	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.4	0.0	10.9
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	10.9
Approach LOS			B

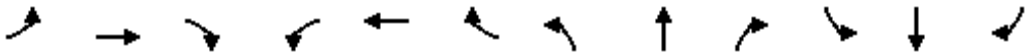
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	193	9	20	182	11	5	5	13	33	1	5
Future Volume (Veh/h)	7	193	9	20	182	11	5	5	13	33	1	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	210	10	22	198	12	5	5	14	36	1	5
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	212			220			486	487	215	498	486	208
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	212			220			486	487	215	498	486	208
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			99	99	98	92	100	99
cM capacity (veh/h)	1356			1349			478	469	825	462	470	830

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	228	232	24	42
Volume Left	8	22	5	36
Volume Right	10	12	14	5
cSH	1356	1349	630	488
Volume to Capacity	0.01	0.02	0.04	0.09
Queue Length 95th (ft)	0	1	3	7
Control Delay (s)	0.3	0.9	10.9	13.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.9	10.9	13.1
Approach LOS			B	B

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	32.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	111	175	69	141	0	94	0	35	0	0	0
Future Volume (vph)	0	111	175	69	141	0	94	0	35	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	121	190	75	153	0	102	0	38	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	311	228	140	0
Volume Left (vph)	0	75	102	0
Volume Right (vph)	190	0	38	0
Hadj (s)	-0.33	0.10	0.02	0.00
Departure Headway (s)	4.2	4.7	5.1	5.3
Degree Utilization, x	0.36	0.30	0.20	0.00
Capacity (veh/h)	822	729	643	595
Control Delay (s)	9.6	9.7	9.4	8.3
Approach Delay (s)	9.6	9.7	9.4	0.0
Approach LOS	A	A	A	A

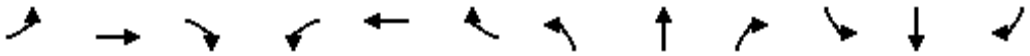
Intersection Summary				
Delay	9.6			
Level of Service	A			
Intersection Capacity Utilization	49.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	51	69	101	32	81	121
Future Volume (vph)	51	69	101	32	81	121
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	75	110	35	88	132

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	130	145	220
Volume Left (vph)	55	0	88
Volume Right (vph)	75	35	0
Hadj (s)	-0.23	-0.11	0.11
Departure Headway (s)	4.5	4.4	4.5
Degree Utilization, x	0.16	0.18	0.27
Capacity (veh/h)	738	791	770
Control Delay (s)	8.4	8.3	9.2
Approach Delay (s)	8.4	8.3	9.2
Approach LOS	A	A	A

Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	235	1	6	189	40	7	10	11	40	16	10
Future Volume (Veh/h)	8	235	1	6	189	40	7	10	11	40	16	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	255	1	7	205	43	8	11	12	43	17	11
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.94						0.94	0.94		0.94	0.94	0.94
vC, conflicting volume	251			267			548	550	274	542	528	234
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	168			267			485	486	274	479	464	149
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	98	98	90	96	99
cM capacity (veh/h)	1319			1285			429	441	752	438	454	837

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	265	255	31	71
Volume Left	9	7	8	43
Volume Right	1	43	12	11
cSH	1319	1285	520	477
Volume to Capacity	0.01	0.01	0.06	0.15
Queue Length 95th (ft)	1	0	5	13
Control Delay (s)	0.3	0.3	12.4	13.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	12.4	13.9
Approach LOS			B	B

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	31.4%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Oceanside Blvd
E/W Street Name	Oceanside Boulevard
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	21	132	76	0	112	134	101	0	39	226	60	0	110	287	15
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	23	146	84	0	124	149	112	0	43	251	67	0	122	318	17
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		253			385			361			457	
Entry Volume veh/h		248			377			354			448	
Circulating Flow (v_c), pc/h	564			317			291			316		
Exiting Flow (v_{ex}), pc/h	335			209			386			526		
Capacity (c_{pce}), pc/h		643			823			845			824	
Capacity (c), veh/h		630			807			828			808	
v/c Ratio (x)		0.39			0.47			0.43			0.55	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		11.3			10.7			9.7			12.6	
Lane LOS		B			B			A			B	
95% Queue, veh		1.9			2.5			2.2			3.5	
Approach Delay, s/veh	11.3			10.7			9.7			12.6		
Approach LOS	B			B			A			B		
Intersection Delay, s/veh | LOS	11.2						B					

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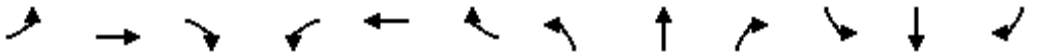

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	324	0	16	417	79	8	8	34	243	13	44
Future Volume (vph)	11	324	0	16	417	79	8	8	34	243	13	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3539		1755	3446			3121			1777	1527
Flt Permitted	0.34	1.00		0.53	1.00			0.92			0.69	1.00
Satd. Flow (perm)	635	3539		979	3446			2886			1293	1527
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	352	0	17	453	86	9	9	37	264	14	48
RTOR Reduction (vph)	0	0	0	0	38	0	0	15	0	0	0	20
Lane Group Flow (vph)	12	352	0	17	501	0	0	40	0	0	278	28
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	13.4	13.4		13.4	13.4			32.1			32.1	32.1
Effective Green, g (s)	13.4	13.4		13.4	13.4			32.1			32.1	32.1
Actuated g/C Ratio	0.24	0.24		0.24	0.24			0.58			0.58	0.58
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	154	862		238	839			1684			754	891
v/s Ratio Prot		0.10			c0.15							
v/s Ratio Perm	0.02			0.02				0.01			c0.22	0.02
v/c Ratio	0.08	0.41		0.07	0.60			0.02			0.37	0.03
Uniform Delay, d1	16.0	17.5		16.0	18.4			4.8			6.1	4.9
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.2	0.3		0.1	1.2			0.0			1.4	0.1
Delay (s)	16.3	17.8		16.1	19.6			4.9			7.5	4.9
Level of Service	B	B		B	B			A			A	A
Approach Delay (s)		17.7			19.5			4.9			7.1	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Morse Street
Agency or Co.	IBI Group	E/W Street Name	Morse Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	24	13	17	0	31	8	114	0	3	378	61	0	95	511	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	27	14	19	0	34	9	126	0	3	419	68	0	105	567	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		60			169			490			691	
Entry Volume veh/h		59			166			480			677	
Circulating Flow (v_c), pc/h	706			449			146			46		
Exiting Flow (v_{ex}), pc/h	187			31			572			620		
Capacity (c_{pce}), pc/h		558			721			977			1079	
Capacity (c), veh/h		547			707			957			1058	
v/c Ratio (x)		0.11			0.23			0.50			0.64	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.9			7.8			10.0			12.4	
Lane LOS		A			A			A			B	
95% Queue, veh		0.4			0.9			2.9			4.8	
Approach Delay, s/veh	7.9			7.8			10.0			12.4		
Approach LOS	A			A			A			B		
Intersection Delay, s/veh | LOS	10.8						B					

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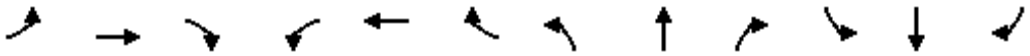
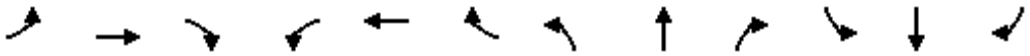


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	144	24	38	125	0	21	0	31	0	0	0
Future Volume (Veh/h)	0	144	24	38	125	0	21	0	31	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	157	26	41	136	0	23	0	34	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	136			183			388	388	170	422	401	136
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	136			183			388	388	170	422	401	136
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			96	100	96	100	100	100
cM capacity (veh/h)	1448			1392			558	531	874	509	522	913

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	183	177	57	0
Volume Left	0	41	23	0
Volume Right	26	0	34	0
cSH	1448	1392	711	1700
Volume to Capacity	0.00	0.03	0.08	0.00
Queue Length 95th (ft)	0	2	7	0
Control Delay (s)	0.0	2.0	10.5	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	2.0	10.5	0.0
Approach LOS			B	A

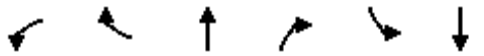
Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	31.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	63	15	4	45	1	26	0	11	1	0	1
Future Volume (Veh/h)	1	63	15	4	45	1	26	0	11	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	68	16	4	49	1	28	0	12	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	50			84			136	136	76	148	144	50
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	50			84			136	136	76	148	144	50
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	100	99	100	100	100
cM capacity (veh/h)	1557			1513			832	752	985	809	745	1019

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	85	54	40	2
Volume Left	1	4	28	1
Volume Right	16	1	12	1
cSH	1557	1513	872	902
Volume to Capacity	0.00	0.00	0.05	0.00
Queue Length 95th (ft)	0	0	4	0
Control Delay (s)	0.1	0.6	9.3	9.0
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.6	9.3	9.0
Approach LOS			A	A

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	14.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	37	106	15	37	132	15
Future Volume (vph)	37	106	15	37	132	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	115	16	40	143	16

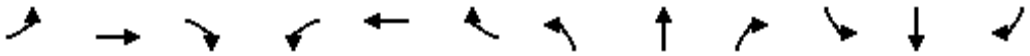
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	155	56	159
Volume Left (vph)	40	0	143
Volume Right (vph)	115	40	0
Hadj (s)	-0.36	-0.39	0.21
Departure Headway (s)	4.0	4.0	4.5
Degree Utilization, x	0.17	0.06	0.20
Capacity (veh/h)	850	847	763
Control Delay (s)	7.9	7.3	8.6
Approach Delay (s)	7.9	7.3	8.6
Approach LOS	A	A	A

Intersection Summary			
Delay	8.1		
Level of Service	A		
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	118	91	15	79	3	69	9	15	13	10	5
Future Volume (Veh/h)	3	118	91	15	79	3	69	9	15	13	10	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	128	99	16	86	3	75	10	16	14	11	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	89			227			314	304	178	324	352	88
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			227			314	304	178	324	352	88
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			88	98	98	98	98	99
cM capacity (veh/h)	1506			1341			620	600	866	603	564	971

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	230	105	101	30
Volume Left	3	16	75	14
Volume Right	99	3	16	5
cSH	1506	1341	647	627
Volume to Capacity	0.00	0.01	0.16	0.05
Queue Length 95th (ft)	0	1	14	4
Control Delay (s)	0.1	1.3	11.6	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	1.3	11.6	11.0
Approach LOS			B	B

Intersection Summary				
Average Delay	3.6			
Intersection Capacity Utilization	28.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	139	9	6	86	2	2	2	17	1	3	1
Future Volume (Veh/h)	0	139	9	6	86	2	2	2	17	1	3	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	151	10	7	93	2	2	2	18	1	3	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	95			161			266	265	156	283	269	94
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	95			161			266	265	156	283	269	94
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	100	100	100
cM capacity (veh/h)	1499			1418			680	637	890	652	634	963

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	161	102	22	5
Volume Left	0	7	2	1
Volume Right	10	2	18	1
cSH	1499	1418	836	685
Volume to Capacity	0.00	0.00	0.03	0.01
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	0.6	9.4	10.3
Lane LOS		A	A	B
Approach Delay (s)	0.0	0.6	9.4	10.3
Approach LOS			A	B

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	19.6%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Cassidy Street
Agency or Co.	IBI Group	E/W Street Name	Cassidy Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	64	89	55	0	74	41	23	0	69	316	43	0	54	346	13
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	71	99	61	0	82	45	26	0	76	350	48	0	60	384	14
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			4.9763	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		231			153			474			458	
Entry Volume veh/h		226			150			465			449	
Circulating Flow (v_c), pc/h		526			497			230			203	
Exiting Flow (v_{ex}), pc/h		207			135			447			527	
Capacity (c_{pce}), pc/h		668			687			898			1122	
Capacity (c), veh/h		655			674			880			1100	
v/c Ratio (x)		0.35			0.22			0.53			0.41	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		10.1			8.0			11.2			7.6	
Lane LOS		B			A			B			A	
95% Queue, veh		1.5			0.8			3.2			2.0	
Approach Delay, s/veh	10.1			8.0			11.2			7.6		
Approach LOS	B			A			B			A		
Intersection Delay, s/veh | LOS	9.4						A					

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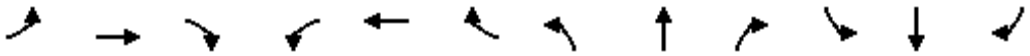
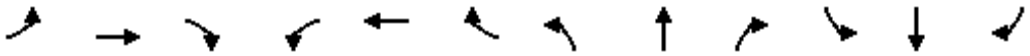


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	116	28	33	66	13	11	27	28	10	23	19
Future Volume (Veh/h)	16	116	28	33	66	13	11	27	28	10	23	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	126	30	36	72	14	12	29	30	11	25	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	86			156			360	333	141	370	341	79
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	86			156			360	333	141	370	341	79
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			98	95	97	98	96	98
cM capacity (veh/h)	1510			1424			548	566	907	530	560	981

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	173	122	71	57
Volume Left	17	36	12	11
Volume Right	30	14	30	21
cSH	1510	1424	668	657
Volume to Capacity	0.01	0.03	0.11	0.09
Queue Length 95th (ft)	1	2	9	7
Control Delay (s)	0.8	2.4	11.0	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.8	2.4	11.0	11.0
Approach LOS			B	B

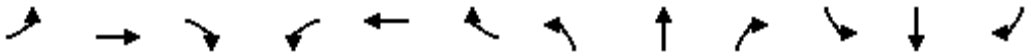
Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	24.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	62	14	8	38	2	11	22	19	11	11	7
Future Volume (vph)	5	62	14	8	38	2	11	22	19	11	11	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	67	15	9	41	2	12	24	21	12	12	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	87	52	57	32
Volume Left (vph)	5	9	12	12
Volume Right (vph)	15	2	21	8
Hadj (s)	-0.06	0.05	-0.14	-0.04
Departure Headway (s)	4.1	4.2	4.1	4.2
Degree Utilization, x	0.10	0.06	0.06	0.04
Capacity (veh/h)	856	828	842	819
Control Delay (s)	7.5	7.5	7.4	7.4
Approach Delay (s)	7.5	7.5	7.4	7.4
Approach LOS	A	A	A	A

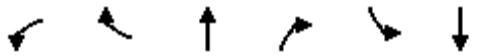
Intersection Summary				
Delay	7.5			
Level of Service	A			
Intersection Capacity Utilization	14.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	108	4	26	49	15	4	45	108	114	8	5
Future Volume (vph)	5	108	4	26	49	15	4	45	108	114	8	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	117	4	28	53	16	4	49	117	124	9	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	126	97	170	138
Volume Left (vph)	5	28	4	124
Volume Right (vph)	4	16	117	5
Hadj (s)	0.02	-0.01	-0.37	0.19
Departure Headway (s)	4.8	4.8	4.3	4.8
Degree Utilization, x	0.17	0.13	0.20	0.19
Capacity (veh/h)	698	694	796	698
Control Delay (s)	8.7	8.5	8.3	8.9
Approach Delay (s)	8.7	8.5	8.3	8.9
Approach LOS	A	A	A	A

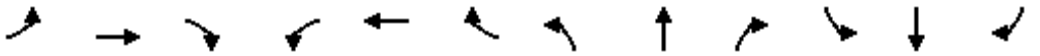
Intersection Summary			
Delay	8.6		
Level of Service	A		
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	51	33	13	59	67
Future Volume (vph)	0	51	33	13	59	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	55	36	14	64	73

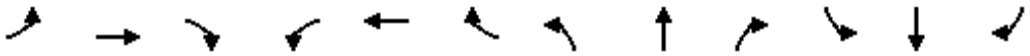
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	55	50	137
Volume Left (vph)	0	0	64
Volume Right (vph)	55	14	0
Hadj (s)	-0.57	-0.13	0.13
Departure Headway (s)	3.7	4.0	4.2
Degree Utilization, x	0.06	0.06	0.16
Capacity (veh/h)	914	869	845
Control Delay (s)	7.0	7.2	8.0
Approach Delay (s)	7.0	7.2	8.0
Approach LOS	A	A	A

Intersection Summary			
Delay	7.6		
Level of Service	A		
Intersection Capacity Utilization	16.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	121	40	256	49	216	29	213	122	183	300	6
Future Volume (vph)	15	121	40	256	49	216	29	213	122	183	300	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0	5.0	4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	1.00	0.96	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	2006	1863	1555		1788	1794	1770	2111	1527	2006	3998	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	2006	1863	1555		1788	1794	1770	2111	1527	2006	3998	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	132	43	278	53	235	32	232	133	199	326	7
RTOR Reduction (vph)	0	0	39	0	0	156	0	0	94	0	2	0
Lane Group Flow (vph)	16	132	4	0	331	79	32	232	39	199	331	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	6.7	6.7	6.7		16.5	23.3	1.4	20.6	20.6	6.8	26.0	
Effective Green, g (s)	6.7	6.7	6.7		16.5	23.3	1.4	20.6	20.6	6.8	26.0	
Actuated g/C Ratio	0.10	0.10	0.10		0.24	0.33	0.02	0.30	0.30	0.10	0.37	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0	5.0	4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	192	179	149		423	599	35	623	451	195	1491	
v/s Ratio Prot	0.01	c0.07			c0.19	0.04	0.02	c0.11		c0.10	0.08	
v/s Ratio Perm			0.00						0.03			
v/c Ratio	0.08	0.74	0.03		0.78	0.13	0.91	0.37	0.09	1.02	0.22	
Uniform Delay, d1	28.7	30.6	28.5		24.9	16.2	34.1	19.4	17.8	31.5	14.9	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	12.7	0.0		9.1	0.1	115.3	1.7	0.4	69.9	0.3	
Delay (s)	28.8	43.4	28.6		34.0	16.3	149.4	21.1	18.1	101.3	15.3	
Level of Service	C	D	C		C	B	F	C	B	F	B	
Approach Delay (s)		38.8			26.7			30.5			47.5	
Approach LOS		D			C			C			D	

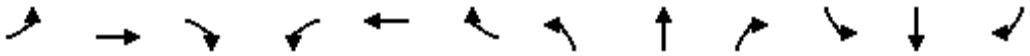
Intersection Summary			
HCM 2000 Control Delay	35.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	69.7	Sum of lost time (s)	19.1
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	434	5	16	646	50	0	0	27	28	0	30
Future Volume (Veh/h)	8	434	5	16	646	50	0	0	27	28	0	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	472	5	17	702	54	0	0	29	30	0	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	756			477			1288	1282	474	1284	1258	729
vC1, stage 1 conf vol							492	492		763	763	
vC2, stage 2 conf vol							796	790		522	495	
vCu, unblocked vol	756			412			1275	1269	409	1271	1243	729
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			100	100	95	91	100	92
cM capacity (veh/h)	855			1078			300	336	604	323	345	423

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	486	773	29	63
Volume Left	9	17	0	30
Volume Right	5	54	29	33
cSH	855	1078	604	368
Volume to Capacity	0.01	0.02	0.05	0.17
Queue Length 95th (ft)	1	1	4	15
Control Delay (s)	0.3	0.4	11.3	16.8
Lane LOS	A	A	B	C
Approach Delay (s)	0.3	0.4	11.3	16.8
Approach LOS			B	C

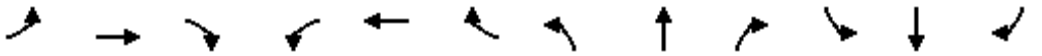
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	62.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	539	12	36	848	28	12	5	78	33	5	17
Future Volume (Veh/h)	11	539	12	36	848	28	12	5	78	33	5	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	586	13	39	922	30	13	5	85	36	5	18
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.98			0.98	0.98	0.98	0.98	0.98	
vC, conflicting volume	952			600			1639	1648	594	1712	1639	938
vC1, stage 1 conf vol							618	618		1015	1015	
vC2, stage 2 conf vol							1022	1030		698	624	
vCu, unblocked vol	952			583			1642	1650	577	1716	1642	938
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			96			94	98	83	83	98	94
cM capacity (veh/h)	722			972			217	251	507	207	256	320

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	12	599	39	952	103	59
Volume Left	12	0	39	0	13	36
Volume Right	0	13	0	30	85	18
cSH	722	1700	972	1700	416	237
Volume to Capacity	0.02	0.35	0.04	0.56	0.25	0.25
Queue Length 95th (ft)	1	0	3	0	24	24
Control Delay (s)	10.1	0.0	8.9	0.0	16.5	25.2
Lane LOS	B		A		C	D
Approach Delay (s)	0.2		0.3		16.5	25.2
Approach LOS					C	D

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	62.8%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	773	0	0	998	147	0	0	0	0	0	24
Future Volume (Veh/h)	31	773	0	0	998	147	0	0	0	0	0	24
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	840	0	0	1085	160	0	0	0	0	0	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1245			840			2019	2153	840	2073	2073	1165
vC1, stage 1 conf vol							908	908		1165	1165	
vC2, stage 2 conf vol							1111	1245		908	908	
vCu, unblocked vol	1245			840			2019	2153	840	2073	2073	1165
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			100			100	100	100	100	100	89
cM capacity (veh/h)	559			795			161	178	365	185	208	236

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	34	840	0	1245	0	26
Volume Left	34	0	0	0	0	0
Volume Right	0	0	0	160	0	26
cSH	559	1700	1700	1700	1700	236
Volume to Capacity	0.06	0.49	0.00	0.73	0.00	0.11
Queue Length 95th (ft)	5	0	0	0	0	9
Control Delay (s)	11.9	0.0	0.0	0.0	0.0	22.1
Lane LOS	B				A	C
Approach Delay (s)	0.5		0.0		0.0	22.1
Approach LOS					A	C

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	71.4%	ICU Level of Service		C
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	82	0	0	70	35	306	28	50	692	12
Future Volume (Veh/h)	0	0	82	0	0	70	35	306	28	50	692	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	89	0	0	76	38	333	30	54	752	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1352	1306	758	1373	1297	348	765			363		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1352	1306	758	1373	1297	348	765			363		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	78	100	100	89	96			95		
cM capacity (veh/h)	106	146	407	90	148	695	848			1196		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	89	76	38	363	54	765
Volume Left	0	0	38	0	54	0
Volume Right	89	76	0	30	0	13
cSH	407	695	848	1700	1196	1700
Volume to Capacity	0.22	0.11	0.04	0.21	0.05	0.45
Queue Length 95th (ft)	21	9	4	0	4	0
Control Delay (s)	16.3	10.8	9.4	0.0	8.2	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	16.3	10.8	0.9		0.5	
Approach LOS	C	B				

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	48.9%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Michigan Avenue
Agency or Co.	IBI Group	E/W Street Name	Michigan Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	84	13	36	0	45	15	8	0	22	234	6	0	6	230	27
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	93	14	40	0	50	17	9	0	24	259	7	0	7	255	30
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		147			76			290			292	
Entry Volume veh/h		144			75			284			286	
Circulating Flow (v_c), pc/h	312			376			114			91		
Exiting Flow (v_{ex}), pc/h	28			71			361			345		
Capacity (c_{pce}), pc/h		827			776			1008			1032	
Capacity (c), veh/h		811			761			988			1011	
v/c Ratio (x)		0.18			0.10			0.29			0.28	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.3			5.7			6.5			6.4	
Lane LOS		A			A			A			A	
95% Queue, veh		0.6			0.3			1.2			1.2	
Approach Delay, s/veh	6.3			5.7			6.5			6.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.4						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - West
Agency or Co.	IBI Group	E/W Street Name	West Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	16	9	18	0	20	9	18	0	18	132	20	0	18	132	16
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	18	10	20	0	22	10	20	0	20	146	22	0	20	146	18
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		48			52			188			184	
Entry Volume veh/h		47			51			184			180	
Circulating Flow (v_c), pc/h	188			184			48			52		
Exiting Flow (v_{ex}), pc/h	52			48			184			188		
Capacity (c_{pce}), pc/h		936			940			1077			1073	
Capacity (c), veh/h		918			922			1056			1052	
v/c Ratio (x)		0.05			0.06			0.17			0.17	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.4			4.4			5.0			5.0	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.2			0.6			0.6	
Approach Delay, s/veh	4.4			4.4			5.0			5.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	4.9						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Kelly
Agency or Co.	IBI Group	E/W Street Name	Kelly Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	21	13	0	15	12	96	0	5	154	14	0	88	146	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	16	23	14	0	17	13	106	0	6	171	16	0	98	162	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		53			136			193			293	
Entry Volume veh/h		52			133			189			287	
Circulating Flow (v_c), pc/h	277			193			137			36		
Exiting Flow (v_{ex}), pc/h	137			52			293			193		
Capacity (c_{pce}), pc/h		857			932			985			1090	
Capacity (c), veh/h		840			913			966			1069	
v/c Ratio (x)		0.06			0.15			0.20			0.27	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.9			5.3			5.6			5.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.5			0.7			1.1	
Approach Delay, s/veh	4.9			5.3			5.6			5.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.6						A					

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Future Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				168	0	0	8	72	0	24	801	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				1328	0	593	148	1692	527	148	1178	527
Arrive On Green				0.36	0.00	0.00	0.08	0.32	0.00	0.08	0.32	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				168	0	0	8	72	0	24	801	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Cycle Q Clear(g_c), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				1328	0	593	148	1692	527	148	1178	527
V/C Ratio(X)				0.13	0.00	0.00	0.05	0.04	0.00	0.16	0.68	0.00
Avail Cap(c_a), veh/h				1328	0	593	148	1692	527	148	1178	527
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				10.7	0.0	0.0	21.3	11.7	0.0	21.4	14.8	0.0
Incr Delay (d2), s/veh				0.2	0.0	0.0	0.7	0.0	0.0	2.4	3.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	0.0	0.1	0.2	0.0	0.4	5.3	0.0
LnGrp Delay(d),s/veh				10.9	0.0	0.0	21.9	11.8	0.0	23.8	18.0	0.0
LnGrp LOS				B			C	B		C	B	
Approach Vol, veh/h					168			80			825	
Approach Delay, s/veh					10.9			12.8			18.1	
Approach LOS					B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	20.0			8.0	20.0		22.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	16.0			4.0	16.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	2.5			2.2	11.5		3.5
Green Ext Time (p_c), s	0.0	0.2			0.0	2.2		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	16.6
HCM 2010 LOS	B

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	531	188	479	1082	0	0
Future Volume (veh/h)	531	188	479	1082	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	577	204	521	1176		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1840	823	1074	3313		
Arrive On Green	0.50	0.50	0.30	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	577	204	521	1176		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	3.7	2.8	4.8	1.9		
Cycle Q Clear(g_c), s	3.7	2.8	4.8	1.9		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1840	823	1074	3313		
V/C Ratio(X)	0.31	0.25	0.49	0.35		
Avail Cap(c_a), veh/h	1840	823	1074	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.9	5.7	11.5	0.3		
Incr Delay (d2), s/veh	0.4	0.7	1.6	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.0	1.4	2.5	1.0		
LnGrp Delay(d),s/veh	6.4	6.4	13.0	0.6		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	781			1697		
Approach Delay, s/veh	6.4			4.4		
Approach LOS	A			A		

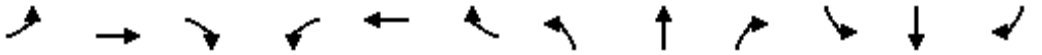
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			16.0	24.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			12.0	20.0				36.0
Max Q Clear Time (g_c+I1), s			6.8	5.7				3.9
Green Ext Time (p_c), s			1.0	4.0				10.8

Intersection Summary	
HCM 2010 Ctrl Delay	5.0
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	640	67	807	1970	67	1
Future Volume (veh/h)	640	67	807	1970	67	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	696	73	877	2141	73	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	982	439	954	2208	492	439
Arrive On Green	0.27	0.27	0.27	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	696	73	877	2141	73	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	10.3	2.0	14.3	33.4	1.8	0.0
Cycle Q Clear(g_c), s	10.3	2.0	14.3	33.4	1.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	982	439	954	2208	492	439
V/C Ratio(X)	0.71	0.17	0.92	0.97	0.15	0.00
Avail Cap(c_a), veh/h	982	439	954	2208	492	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.9	16.9	21.4	11.5	16.8	0.0
Incr Delay (d2), s/veh	4.3	0.8	15.1	13.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	1.0	8.9	20.4	1.0	0.0
LnGrp Delay(d),s/veh	24.2	17.7	36.5	24.7	17.4	0.0
LnGrp LOS	C	B	D	C	B	
Approach Vol, veh/h	769			3018	73	
Approach Delay, s/veh	23.6			28.1	17.4	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		3.8	16.3	12.3				35.4
Green Ext Time (p_c), s		0.1	0.0	1.7				0.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.0
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Future Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	312	3	100	542	0	11	0	121	24	34	35
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1149	11	284	1982	887	0	0	0	568	596	507
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3832	36	1845	3681	1647		0		1845	1937	1647
Grp Volume(v), veh/h	0	154	161	100	542	0		0.0		24	34	35
Grp Sat Flow(s),veh/h/ln	0	1840	1931	1845	1840	1647				1845	1937	1647
Q Serve(g_s), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Cycle Q Clear(g_c), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	566	594	284	1982	887				568	596	507
V/C Ratio(X)	0.00	0.27	0.27	0.35	0.27	0.00				0.04	0.06	0.07
Avail Cap(c_a), veh/h	0	566	594	284	1982	887				568	596	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.6	13.6	19.7	6.5	0.0				12.6	12.7	12.7
Incr Delay (d2), s/veh	0.0	1.2	1.1	3.4	0.3	0.0				0.1	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	1.9	1.5	2.1	0.0				0.3	0.4	0.4
LnGrp Delay(d),s/veh	0.0	14.8	14.7	23.1	6.8	0.0				12.8	12.9	13.0
LnGrp LOS		B	B	C	A					B	B	B
Approach Vol, veh/h		315			642						93	
Approach Delay, s/veh		14.7			9.4						12.9	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			4.5	5.3		2.8		6.1
Green Ext Time (p_c), s			0.1	1.3		0.2		3.7

Intersection Summary	
HCM 2010 Ctrl Delay	11.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Future Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	250	505	5	10	665	386	11	11	21	107	62	62
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	158	960	10	105	841	376	216	216	376	422	203	203
Arrive On Green	0.09	0.26	0.26	0.04	0.15	0.15	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3734	37	1845	3681	1647	945	945	1647	1845	890	890
Grp Volume(v), veh/h	250	249	261	10	665	386	22	0	21	107	0	124
Grp Sat Flow(s),veh/h/ln	1845	1840	1931	1845	1840	1647	1890	0	1647	1845	0	1780
Q Serve(g_s), s	6.0	8.1	8.1	0.4	12.2	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Cycle Q Clear(g_c), s	6.0	8.1	8.1	0.4	12.2	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Prop In Lane	1.00		0.02	1.00		1.00	0.50		1.00	1.00		0.50
Lane Grp Cap(c), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
V/C Ratio(X)	1.58	0.53	0.53	0.09	0.79	1.03	0.05	0.00	0.06	0.25	0.00	0.30
Avail Cap(c_a), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
HCM Platoon Ratio	1.00	1.00	1.00	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.0	22.3	22.3	31.9	28.0	29.6	21.1	0.0	21.1	22.1	0.0	22.4
Incr Delay (d2), s/veh	289.4	4.1	4.0	1.8	7.5	53.1	0.2	0.0	0.3	1.4	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.7	4.6	4.8	0.2	7.1	12.8	0.4	0.0	0.3	1.9	0.0	2.2
LnGrp Delay(d),s/veh	321.4	26.5	26.3	33.7	35.5	82.7	21.3	0.0	21.4	23.6	0.0	24.3
LnGrp LOS	F	C	C	C	D	F	C		C	C		C
Approach Vol, veh/h		760			1061			43			231	
Approach Delay, s/veh		123.4			52.7			21.3			24.0	
Approach LOS		F			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	10.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.7	2.4	10.1		6.0	8.0	18.0
Green Ext Time (p_c), s		0.1	0.0	1.9		0.7	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	74.5
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	492	362	132	894	400	422	443	376	422	443	376
Arrive On Green	0.07	0.24	0.24	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	2026	1489	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	388	355	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1674	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.0	14.1	14.3	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.0	14.1	14.3	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		0.89	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.87	0.87	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.6	25.4	25.5	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	19.8	22.1	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	9.6	9.1	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	51.7	45.2	47.5	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	D	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		46.9			43.4			27.3			30.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	16.3		11.8	5.0	17.8
Green Ext Time (p_c), s		1.3	0.0	0.4		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	38.7
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Future Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	93	8	17	71	42	2	5	7	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.8	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	15%	21%	13%
Vol Thru, %	38%	73%	54%
Vol Right, %	46%	6%	33%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	13	118	120
LT Vol	2	25	16
Through Vol	5	86	65
RT Vol	6	7	39
Lane Flow Rate	14	128	130
Geometry Grp	1	1	1
Degree of Util (X)	0.017	0.145	0.141
Departure Headway (Hd)	4.232	4.064	3.887
Convergence, Y/N	Yes	Yes	Yes
Cap	851	881	920
Service Time	2.232	2.093	1.921
HCM Lane V/C Ratio	0.016	0.145	0.141
HCM Control Delay	7.3	7.8	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.5

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Future Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	161	75	54	64	0	0	0	0	18	0	60

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	-	0	0	161	0	0	333	333	64
Stage 1	-	-	-	-	-	-	172	172	-
Stage 2	-	-	-	-	-	-	161	161	-
Critical Hdwy	-	-	-	4.12	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1418	-	0	662	587	1000
Stage 1	0	-	-	-	-	0	858	756	-
Stage 2	0	-	-	-	-	0	868	765	-
Platoon blocked, %		-	-		-				
Mov Cap-1 Maneuver	-	-	-	1418	-	-	636	0	1000
Mov Cap-2 Maneuver	-	-	-	-	-	-	636	0	-
Stage 1	-	-	-	-	-	-	825	0	-
Stage 2	-	-	-	-	-	-	868	0	-

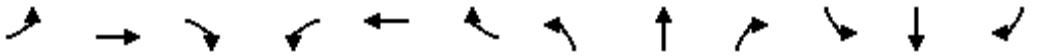
Approach	EB	WB	SB
HCM Control Delay, s	0	3.5	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1418	-	636	1000
HCM Lane V/C Ratio	-	-	0.038	-	0.029	0.06
HCM Control Delay (s)	-	-	7.6	0	10.8	8.8
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	518	201	1018	1229	17	967
Future Volume (veh/h)	518	201	1018	1229	17	967
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	563	0	1107	1336	18	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	883	395	1384	1317	394	618
Arrive On Green	0.24	0.00	0.39	0.68	0.21	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	563	0	1107	1336	18	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	10.3	0.0	20.6	51.0	0.6	0.0
Cycle Q Clear(g_c), s	10.3	0.0	20.6	51.0	0.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	883	395	1384	1317	394	618
V/C Ratio(X)	0.64	0.00	0.80	1.01	0.05	0.00
Avail Cap(c_a), veh/h	883	395	1384	1317	394	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.6	0.0	20.4	12.0	23.4	0.0
Incr Delay (d2), s/veh	3.5	0.0	4.9	28.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	11.1	36.7	0.3	0.0
LnGrp Delay(d),s/veh	29.1	0.0	25.4	40.4	23.7	0.0
LnGrp LOS	C		C	F	C	
Approach Vol, veh/h	563			2443	18	
Approach Delay, s/veh	29.1			33.6	23.7	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	33.0	22.0				55.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	29.0	18.0				51.0
Max Q Clear Time (g_c+I1), s		2.6	22.6	12.3				53.0
Green Ext Time (p_c), s		0.0	2.6	1.8				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	32.7
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	107	194	477	307	1656	215	37	179	119	73	77
Future Volume (vph)	270	107	194	477	307	1656	215	37	179	119	73	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3019	1441		1786	1583		1807	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3019	1441		1786	1583		1807	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	116	211	518	334	1800	234	40	195	129	79	84
RTOR Reduction (vph)	0	0	190	0	491	503	0	0	117	0	0	70
Lane Group Flow (vph)	293	116	21	518	743	397	0	274	78	0	208	14
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	16.9	9.8	9.8	33.7	28.2	28.2		21.2	21.2		17.0	17.0
Effective Green, g (s)	16.9	9.8	9.8	33.7	28.2	28.2		21.2	21.2		17.0	17.0
Actuated g/C Ratio	0.17	0.10	0.10	0.34	0.28	0.28		0.21	0.21		0.17	0.17
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	299	182	155	596	851	406		378	335		307	269
v/s Ratio Prot	0.17	0.06		c0.29	0.25			c0.15			c0.12	
v/s Ratio Perm			0.01			c0.28			0.05			0.01
v/c Ratio	0.98	0.64	0.13	0.87	0.98dr	0.98		0.72	0.23		0.68	0.05
Uniform Delay, d1	41.4	43.4	41.2	31.1	34.2	35.6		36.7	32.7		38.9	34.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	46.0	5.3	0.1	12.8	9.5	38.5		11.5	1.6		11.4	0.4
Delay (s)	87.3	48.7	41.4	43.9	43.7	74.1		48.2	34.3		50.3	35.1
Level of Service	F	D	D	D	D	E		D	C		D	D
Approach Delay (s)		64.5			54.1			42.4			46.0	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	53.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.3
Intersection Capacity Utilization	108.1%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	661	0	327	0	0	443	674	0	563	568	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	0	0	0	0	733	0	355	0	0	491	747	0	624	630	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929		4.6453	4.3276			4.3276		4.6453	4.3276	
Follow-Up Headway (s)		3.1858		2.6667	2.5352			2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		0		0	733	355		491	747	624	630	
Entry Volume veh/h		0		0	719	355		481	732	612	618	
Circulating Flow (v_c), pc/h	1987			491			624			733		
Exiting Flow (v_{ex}), pc/h	624			0			491			1363		
Capacity (c_{pce}), pc/h		155		859	935			835		688	762	
Capacity (c), veh/h		152		842	917			819		674	747	
v/c Ratio (x)		0.00		0.00	0.78			0.59		0.91	0.83	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.7		4.3	20.4	0.0		13.4	0.0	40.1	27.6	
Lane LOS		C		A	C	A		B	A	E	D	
95% Queue, veh		0.0		0.0	8.2			3.9		11.7	9.2	
Approach Delay, s/veh				13.7			5.3			33.8		
Approach LOS				B			A			D		
Intersection Delay, s/veh | LOS	17.8						C					

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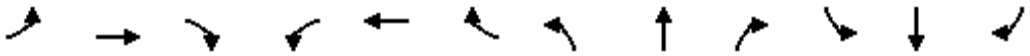

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	21	11	92	36	158	18	105	97	182	142	12
Future Volume (vph)	0	21	11	92	36	158	18	105	97	182	142	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	12	100	39	172	20	114	105	198	154	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	35	311	239	365
Volume Left (vph)	0	100	20	198
Volume Right (vph)	12	172	105	13
Hadj (s)	-0.17	-0.23	-0.21	0.12
Departure Headway (s)	6.0	5.3	5.3	5.4
Degree Utilization, x	0.06	0.46	0.35	0.55
Capacity (veh/h)	491	625	628	637
Control Delay (s)	9.3	12.8	11.0	14.6
Approach Delay (s)	9.3	12.8	11.0	14.6
Approach LOS	A	B	B	B

Intersection Summary				
Delay	12.9			
Level of Service	B			
Intersection Capacity Utilization	64.1%	ICU Level of Service	C	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Surfrider Way
E/W Street Name	Surfrider Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1
Lane Assignment			LTR				LTR				LTR		LT		R	
Volume (V), veh/h	0	245	81	102	0	17	71	43	0	72	721	27	0	69	729	177
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	272	90	113	0	19	79	48	0	80	799	30	0	76	808	196
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929		4.5436	4.5436	
Follow-Up Headway (s)		3.1858			3.1858			3.1858		2.5352	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		475			146			909		884	196	
Entry Volume veh/h		466			143			891		867	192	
Circulating Flow (v_c), pc/h	903			1151			438			178		
Exiting Flow (v_{ex}), pc/h	196			355			1119			940		
Capacity (c_{pce}), pc/h		458			357			729		1208	1208	
Capacity (c), veh/h		449			350			715		1184	1184	
v/c Ratio (x)		1.04			0.41			1.25		0.73	0.16	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		83.1			19.2			142.3		14.5	4.4	
Lane LOS		F			C			F		B	A	
95% Queue, veh		14.3			1.9			32.4		7.0	0.6	
Approach Delay, s/veh	83.1			19.2			142.3			12.7		
Approach LOS	F			C			F			B		
Intersection Delay, s/veh | LOS	71.0						F					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Civic Center Drive
Agency or Co.	IBI Group	E/W Street Name	Civic Center Drive
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	36	38	32	0	36	45	76	0	27	730	65	0	42	762	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	40	42	35	0	40	50	84	0	30	809	72	0	47	845	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		117			174			911			925	
Entry Volume veh/h		115			171			893			907	
Circulating Flow (v_c), pc/h	932			879			129			120		
Exiting Flow (v_{ex}), pc/h	161			113			933			920		
Capacity (c_{pce}), pc/h		445			469			993			1002	
Capacity (c), veh/h		436			460			974			983	
v/c Ratio (x)		0.26			0.37			0.92			0.92	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.5			14.2			32.9			33.6	
Lane LOS		B			B			D			D	
95% Queue, veh		1.0			1.7			13.9			14.3	
Approach Delay, s/veh	12.5			14.2			32.9			33.6		
Approach LOS	B			B			D			D		
Intersection Delay, s/veh | LOS	30.6						D					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Pier View Way
Agency or Co.	IBI Group	E/W Street Name	Pier View Way
Date Performed	7/11/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	72	27	79	0	4	27	10	0	60	810	9	0	5	810	136
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	80	30	88	0	4	30	11	0	67	898	10	0	6	898	151
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		198			45			975			1055	
Entry Volume veh/h		194			44			956			1034	
Circulating Flow (v_c), pc/h		908			1045			116			101	
Exiting Flow (v_{ex}), pc/h		46			248			989			990	
Capacity (c_{pce}), pc/h		456			397			1006			1021	
Capacity (c), veh/h		447			390			987			1001	
v/c Ratio (x)		0.43			0.11			0.97			1.03	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		16.3			11.0			42.0			57.5	
Lane LOS		C			B			E			F	
95% Queue, veh		2.2			0.4			17.1			21.9	
Approach Delay, s/veh	16.3			11.0			42.0			57.5		
Approach LOS	C			B			E			F		
Intersection Delay, s/veh | LOS	46.4						E					

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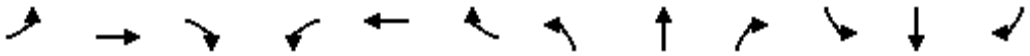


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	15	8	117	57	8	14	40	405	27	14	364	12
Future Volume (vph)	15	8	117	57	8	14	40	405	27	14	364	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	9	127	62	9	15	43	440	29	15	396	13

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	25	127	86	263	249	213	211
Volume Left (vph)	16	0	62	43	0	15	0
Volume Right (vph)	0	127	15	0	29	0	13
Hadj (s)	0.35	-0.67	0.07	0.12	-0.05	0.07	-0.01
Departure Headway (s)	7.3	6.2	7.0	6.0	5.8	6.0	5.9
Degree Utilization, x	0.05	0.22	0.17	0.44	0.40	0.36	0.35
Capacity (veh/h)	453	527	472	586	601	575	583
Control Delay (s)	9.5	9.8	11.3	12.3	11.4	11.1	10.9
Approach Delay (s)	9.7		11.3	11.9		11.0	
Approach LOS	A		B	B		B	

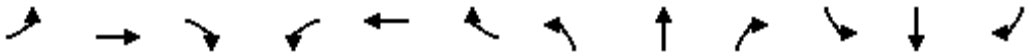
Intersection Summary				
Delay	11.3			
Level of Service	B			
Intersection Capacity Utilization	45.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	284	100	186	197	73	218
Future Volume (vph)	284	100	186	197	73	218
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	309	109	202	214	79	237

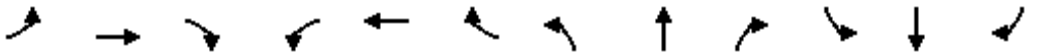
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	309	109	416	316
Volume Left (vph)	309	0	0	79
Volume Right (vph)	0	109	214	0
Hadj (s)	0.53	-0.67	-0.27	0.08
Departure Headway (s)	7.1	5.8	5.5	6.0
Degree Utilization, x	0.61	0.18	0.64	0.53
Capacity (veh/h)	489	586	626	574
Control Delay (s)	19.1	8.9	17.6	15.4
Approach Delay (s)	16.4		17.6	15.4
Approach LOS	C		C	C

Intersection Summary			
Delay	16.6		
Level of Service	C		
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	322	83	294	89	0	0	0	0	131	94
Future Volume (vph)	45	0	322	83	294	89	0	0	0	0	131	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.94	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3416						3317	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3416						3317	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	0	350	90	320	97	0	0	0	0	142	102
RTOR Reduction (vph)	0	0	319	46	43	0	0	0	0	0	86	0
Lane Group Flow (vph)	49	0	32	44	374	0	0	0	0	0	158	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	4.5		4.5	24.4	24.4						7.6	
Effective Green, g (s)	4.5		4.5	24.4	24.4						7.6	
Actuated g/C Ratio	0.09		0.09	0.49	0.49						0.15	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	159		250	863	1667						504	
v/s Ratio Prot	c0.03		0.01	0.02	c0.11						c0.05	
v/s Ratio Perm												
v/c Ratio	0.31		0.13	0.05	0.22						0.31	
Uniform Delay, d1	21.3		20.9	6.7	7.4						18.9	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	1.1		0.2	0.1	0.3						0.4	
Delay (s)	22.4		21.2	6.8	7.7						19.2	
Level of Service	C		C	A	A						B	
Approach Delay (s)		21.3			7.5			0.0			19.2	
Approach LOS		C			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	33.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	193	443	72	272	743	0	0	602	199
Future Volume (vph)	0	0	0	193	443	72	272	743	0	0	602	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1519	1770	1863			1759	1454
Flt Permitted				0.95	1.00	1.00	0.12	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1519	219	1863			1759	1454
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	210	482	78	296	808	0	0	654	216
RTOR Reduction (vph)	0	0	0	0	0	60	0	0	0	0	1	59
Lane Group Flow (vph)	0	0	0	210	482	18	296	808	0	0	675	135
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.0	18.0	18.0	48.4	48.4			29.0	29.0
Effective Green, g (s)				18.0	18.0	18.0	48.4	48.4			29.0	29.0
Actuated g/C Ratio				0.24	0.24	0.24	0.63	0.63			0.38	0.38
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				417	833	357	431	1180			667	551
v/s Ratio Prot				0.12	c0.14		0.13	c0.43			c0.38	
v/s Ratio Perm						0.01	0.31					0.09
v/c Ratio				0.50	0.58	0.05	0.69	0.68			1.01	0.25
Uniform Delay, d1				25.3	25.8	22.6	23.7	9.1			23.7	16.2
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				4.3	2.9	0.3	4.9	1.8			37.8	0.3
Delay (s)				29.6	28.8	22.9	28.6	10.9			61.5	16.5
Level of Service				C	C	C	C	B			E	B
Approach Delay (s)		0.0			28.4			15.6			51.4	
Approach LOS		A			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	30.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	145	0	132	715	295	16	83	317	411	55	22
Future Volume (vph)	19	145	0	132	715	295	16	83	317	411	55	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539		1770	3539	1583		1848	1583	1681	1688	
Flt Permitted	0.26	1.00		0.65	1.00	1.00		0.94	1.00	0.69	0.73	
Satd. Flow (perm)	488	3539		1214	3539	1583		1754	1583	1217	1275	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	158	0	143	777	321	17	90	345	447	60	24
RTOR Reduction (vph)	0	0	0	0	0	206	0	0	184	0	6	0
Lane Group Flow (vph)	21	158	0	143	777	115	0	107	161	259	266	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	20.1	20.1		19.7	19.7	19.7		25.7	25.7	25.7	25.7	
Effective Green, g (s)	20.1	20.1		19.7	19.7	19.7		25.7	25.7	25.7	25.7	
Actuated g/C Ratio	0.37	0.37		0.36	0.36	0.36		0.47	0.47	0.47	0.47	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	178	1293		434	1267	567		819	739	568	595	
v/s Ratio Prot		0.04			c0.22							
v/s Ratio Perm	0.04			0.12		0.07		0.06	0.10	c0.21	0.21	
v/c Ratio	0.12	0.12		0.33	0.61	0.20		0.13	0.22	0.46	0.45	
Uniform Delay, d1	11.6	11.6		12.8	14.5	12.2		8.3	8.7	9.9	9.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.5	0.9	0.2		0.3	0.7	2.6	2.4	
Delay (s)	12.0	11.6		13.4	15.4	12.4		8.6	9.4	12.5	12.3	
Level of Service	B	B		B	B	B		A	A	B	B	
Approach Delay (s)		11.7			14.4			9.2			12.4	
Approach LOS		B			B			A			B	

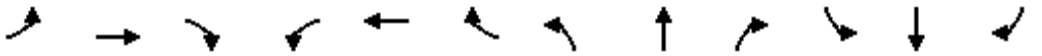
Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	281	16	25	58	26	32
Future Volume (Veh/h)	281	16	25	58	26	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	305	17	27	63	28	35
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			322		430	314
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			322		430	314
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		95	95
cM capacity (veh/h)			1238		569	727

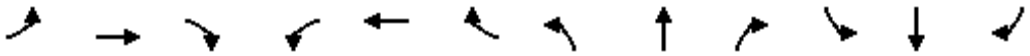
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	322	90	63
Volume Left	0	27	28
Volume Right	17	0	35
cSH	1700	1238	647
Volume to Capacity	0.19	0.02	0.10
Queue Length 95th (ft)	0	2	8
Control Delay (s)	0.0	2.5	11.2
Lane LOS		A	B
Approach Delay (s)	0.0	2.5	11.2
Approach LOS			B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	368	210	234	0	0	0	97	492	145	155	422	120
Future Volume (vph)	368	210	234	0	0	0	97	492	145	155	422	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.94				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1493				1770	1863	1552	1770	1863	1516
Flt Permitted	0.95	1.00	1.00				0.50	1.00	1.00	0.21	1.00	1.00
Satd. Flow (perm)	1770	1863	1493				929	1863	1552	383	1863	1516
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	400	228	254	0	0	0	105	535	158	168	459	130
RTOR Reduction (vph)	0	0	165	0	0	0	0	0	84	0	0	65
Lane Group Flow (vph)	400	228	89	0	0	0	105	535	74	168	459	65
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	21.0	21.0	21.0				23.0	23.0	23.0	30.2	30.2	30.2
Effective Green, g (s)	21.0	21.0	21.0				23.0	23.0	23.0	30.2	30.2	30.2
Actuated g/C Ratio	0.35	0.35	0.35				0.38	0.38	0.38	0.50	0.50	0.50
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	619	652	522				356	714	594	266	937	763
v/s Ratio Prot	c0.23	0.12						c0.29		0.03	c0.25	
v/s Ratio Perm			0.06				0.11		0.05	0.28		0.04
v/c Ratio	0.65	0.35	0.17				0.29	0.75	0.12	0.63	0.49	0.09
Uniform Delay, d1	16.4	14.4	13.5				12.9	16.0	12.0	10.5	9.8	7.7
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	1.5	0.7				2.1	7.1	0.4	4.8	1.8	0.2
Delay (s)	21.5	15.9	14.2				15.0	23.1	12.4	15.3	11.7	8.0
Level of Service	C	B	B				B	C	B	B	B	A
Approach Delay (s)		18.0			0.0			19.9			11.8	
Approach LOS		B			A			B			B	

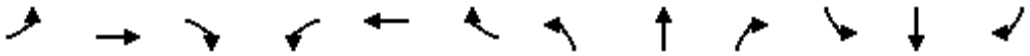
Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	530	35	0	0	0	0	10	35	30	28	0
Future Volume (Veh/h)	16	530	35	0	0	0	0	10	35	30	28	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	576	38	0	0	0	0	11	38	33	30	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			614			644	629	307	366	648	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			614			644	629	307	366	648	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	94	92	100
cM capacity (veh/h)	1622			961			334	393	689	519	384	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	305	326	49	63
Volume Left	17	0	0	33
Volume Right	0	38	38	0
cSH	1622	1700	590	444
Volume to Capacity	0.01	0.19	0.08	0.14
Queue Length 95th (ft)	1	0	7	12
Control Delay (s)	0.5	0.0	11.7	14.4
Lane LOS	A		B	B
Approach Delay (s)	0.2		11.7	14.4
Approach LOS			B	B

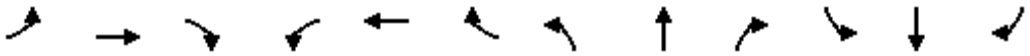
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	32.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Future Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	1248	26	0	0	0	0	14	34	61	53	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	664	650	48	114
Volume Left (vph)	40	0	0	61
Volume Right (vph)	0	26	34	0
Hadj (s)	0.06	0.01	-0.39	0.14
Departure Headway (s)	5.1	5.0	5.6	6.0
Degree Utilization, x	0.93	0.90	0.08	0.19
Capacity (veh/h)	702	714	628	586
Control Delay (s)	40.6	35.3	9.1	10.5
Approach Delay (s)	38.0		9.1	10.5
Approach LOS	E		A	B

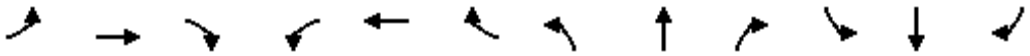
Intersection Summary				
Delay	34.9			
Level of Service	D			
Intersection Capacity Utilization	52.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	271	479	13	42	0	20	0	19	12	0	0	0
Future Volume (vph)	271	479	13	42	0	20	0	19	12	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	295	521	14	46	0	22	0	21	13	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	295	535	68	34
Volume Left (vph)	295	0	46	0
Volume Right (vph)	0	14	22	13
Hadj (s)	0.53	0.02	-0.02	-0.20
Departure Headway (s)	5.2	4.7	4.7	5.4
Degree Utilization, x	0.42	0.69	0.09	0.05
Capacity (veh/h)	690	767	737	623
Control Delay (s)	10.8	16.3	8.2	8.7
Approach Delay (s)	14.3		8.2	8.7
Approach LOS	B		A	A

Intersection Summary				
Delay	13.7			
Level of Service	B			
Intersection Capacity Utilization	42.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	38	0	0	31	17	576	45	22	527	18
Future Volume (Veh/h)	0	0	38	0	0	31	17	576	45	22	527	18
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	41	0	0	34	18	626	49	24	573	20
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked	0.87	0.87	0.83	0.87	0.87	0.92	0.83			0.92		
vC, conflicting volume	1334	1356	590	1356	1342	658	600			682		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1106	1132	399	1131	1115	587	411			613		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	93	98			97		
cM capacity (veh/h)	143	166	535	137	169	467	943			884		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	41	34	18	675	24	593
Volume Left	0	0	18	0	24	0
Volume Right	41	34	0	49	0	20
cSH	535	467	943	1700	884	1700
Volume to Capacity	0.08	0.07	0.02	0.40	0.03	0.35
Queue Length 95th (ft)	6	6	1	0	2	0
Control Delay (s)	12.3	13.3	8.9	0.0	9.2	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.3	13.3	0.2		0.4	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	43.1%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	0	71	0	45	10	13	0	46	577	20	0	25	524	61
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	16	0	79	0	50	11	14	0	51	640	22	0	28	581	68
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		95			75			713			677	
Entry Volume veh/h		93			74			699			664	
Circulating Flow (v_c), pc/h	659			707			44			112		
Exiting Flow (v_{ex}), pc/h	50			130			670			710		
Capacity (c_{pce}), pc/h		585			557			1081			1010	
Capacity (c), veh/h		573			546			1060			990	
v/c Ratio (x)		0.16			0.13			0.66			0.67	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.3			8.3			13.0			14.0	
Lane LOS		A			A			B			B	
95% Queue, veh		0.6			0.5			5.2			5.4	
Approach Delay, s/veh	8.3			8.3			13.0			14.0		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh | LOS	12.9						B					

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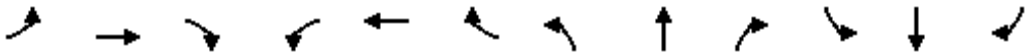
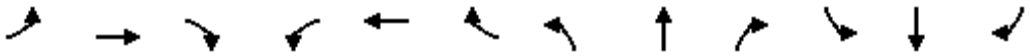


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	49	76	31	91	6	137	4	287	73	163	177	3
Future Volume (vph)	49	76	31	91	6	137	4	287	73	163	177	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	83	34	99	7	149	4	312	79	177	192	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	170	255	395	372
Volume Left (vph)	53	99	4	177
Volume Right (vph)	34	149	79	3
Hadj (s)	-0.02	-0.24	-0.08	0.12
Departure Headway (s)	7.0	6.5	6.1	6.3
Degree Utilization, x	0.33	0.46	0.67	0.65
Capacity (veh/h)	431	485	559	532
Control Delay (s)	13.3	14.9	20.4	20.4
Approach Delay (s)	13.3	14.9	20.4	20.4
Approach LOS	B	B	C	C

Intersection Summary				
Delay	18.2			
Level of Service	C			
Intersection Capacity Utilization	68.1%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	334	48	21	233	38	45	70	71	30	94	15
Future Volume (Veh/h)	13	334	48	21	233	38	45	70	71	30	94	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	363	52	23	253	41	49	76	77	33	102	16
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked	0.98						0.98	0.98		0.98	0.98	0.98
vC, conflicting volume	308			422			812	778	396	866	784	288
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	280			422			795	761	396	850	766	260
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			76	76	88	82	67	98
cM capacity (veh/h)	1239			1131			208	312	650	187	309	751

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	429	317	202	151
Volume Left	14	23	49	33
Volume Right	52	41	77	16
cSH	1239	1131	338	286
Volume to Capacity	0.01	0.02	0.60	0.53
Queue Length 95th (ft)	1	2	92	72
Control Delay (s)	0.4	0.8	30.3	30.8
Lane LOS	A	A	D	D
Approach Delay (s)	0.4	0.8	30.3	30.8
Approach LOS			D	D

Intersection Summary			
Average Delay	10.2		
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	101	124	179	0	118	99	21	0	157	568	128	0	23	568	50
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	112	137	198	0	131	110	23	0	174	630	142	0	26	630	55
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		447			264			946			711	
Entry Volume veh/h		438			259			927			697	
Circulating Flow (v_c), pc/h		787			916			275			415	
Exiting Flow (v_{ex}), pc/h		305			339			765			959	
Capacity (c_{pce}), pc/h		514			452			858			746	
Capacity (c), veh/h		504			443			841			732	
v/c Ratio (x)		0.87			0.58			1.10			0.95	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		42.5			21.8			83.7			46.2	
Lane LOS		E			C			F			E	
95% Queue, veh		9.3			3.6			24.8			14.2	
Approach Delay, s/veh	42.5			21.8			83.7			46.2		
Approach LOS	E			C			F			E		
Intersection Delay, s/veh | LOS	57.8						F					

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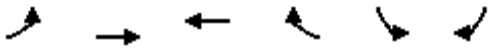
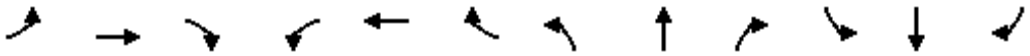


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	433	322	23	34	36
Future Volume (Veh/h)	8	433	322	23	34	36
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	471	350	25	37	39
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	383				860	372
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	383				860	372
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				88	94
cM capacity (veh/h)	1168				321	669

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	480	375	76
Volume Left	9	0	37
Volume Right	0	25	39
cSH	1168	1700	438
Volume to Capacity	0.01	0.22	0.17
Queue Length 95th (ft)	1	0	16
Control Delay (s)	0.2	0.0	14.9
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	14.9
Approach LOS			B

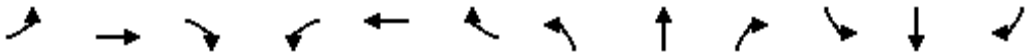
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	443	4	2	296	27	2	1	3	41	0	33
Future Volume (Veh/h)	24	443	4	2	296	27	2	1	3	41	0	33
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	482	4	2	322	29	2	1	3	45	0	36
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	353			486			914	893	484	882	880	340
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	353			486			914	893	484	882	880	340
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			99	100	99	83	100	95
cM capacity (veh/h)	1204			1077			236	274	583	259	278	700

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	512	353	6	81
Volume Left	26	2	2	45
Volume Right	4	29	3	36
cSH	1204	1077	347	360
Volume to Capacity	0.02	0.00	0.02	0.23
Queue Length 95th (ft)	2	0	1	21
Control Delay (s)	0.6	0.1	15.6	17.9
Lane LOS	A	A	C	C
Approach Delay (s)	0.6	0.1	15.6	17.9
Approach LOS			C	C

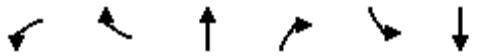
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	54.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	265	266	80	192	0	158	0	111	0	0	0
Future Volume (vph)	0	265	266	80	192	0	158	0	111	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	288	289	87	209	0	172	0	121	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	577	296	293	0
Volume Left (vph)	0	87	172	0
Volume Right (vph)	289	0	121	0
Hadj (s)	-0.27	0.09	-0.10	0.00
Departure Headway (s)	5.1	5.8	6.0	7.0
Degree Utilization, x	0.82	0.48	0.49	0.00
Capacity (veh/h)	690	589	560	444
Control Delay (s)	26.5	14.0	14.7	10.0
Approach Delay (s)	26.5	14.0	14.7	0.0
Approach LOS	D	B	B	A

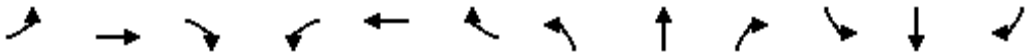
Intersection Summary				
Delay	20.4			
Level of Service	C			
Intersection Capacity Utilization	76.0%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	69	135	219	101	98	214
Future Volume (vph)	69	135	219	101	98	214
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	147	238	110	107	233

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	222	348	340
Volume Left (vph)	75	0	107
Volume Right (vph)	147	110	0
Hadj (s)	-0.30	-0.16	0.10
Departure Headway (s)	5.2	4.8	5.1
Degree Utilization, x	0.32	0.47	0.48
Capacity (veh/h)	622	715	679
Control Delay (s)	10.7	12.0	12.6
Approach Delay (s)	10.7	12.0	12.6
Approach LOS	B	B	B

Intersection Summary			
Delay	11.9		
Level of Service	B		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	358	21	20	296	77	29	46	38	84	28	23
Future Volume (Veh/h)	15	358	21	20	296	77	29	46	38	84	28	23
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	389	23	22	322	84	32	50	41	91	30	25
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.90						0.90	0.90		0.90	0.90	0.90
vC, conflicting volume	409			423			896	896	420	918	866	371
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	294			423			832	833	420	856	799	252
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			85	81	93	53	89	96
cM capacity (veh/h)	1144			1126			220	263	624	192	275	708

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	428	428	123	146
Volume Left	16	22	32	91
Volume Right	23	84	41	25
cSH	1144	1126	307	236
Volume to Capacity	0.01	0.02	0.40	0.62
Queue Length 95th (ft)	1	1	46	92
Control Delay (s)	0.5	0.6	24.4	42.1
Lane LOS	A	A	C	E
Approach Delay (s)	0.5	0.6	24.4	42.1
Approach LOS			C	E

Intersection Summary				
Average Delay	8.5			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Oceanside Blvd
E/W Street Name	Oceanside Boulevard
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	56	218	87	0	261	212	218	0	92	646	168	0	225	549	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	62	242	96	0	289	235	242	0	102	716	186	0	249	609	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		400			766			1004			891	
Entry Volume veh/h		392			751			984			874	
Circulating Flow (v_c), pc/h	1147			880			553			626		
Exiting Flow (v_{ex}), pc/h	677			370			1020			994		
Capacity (c_{pce}), pc/h		359			469			650			604	
Capacity (c), veh/h		352			460			637			592	
v/c Ratio (x)		1.11			1.63			1.54			1.47	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		117.1			317.2			270.8			242.1	
Lane LOS		F			F			F			F	
95% Queue, veh		14.9			43.0			50.7			42.8	
Approach Delay, s/veh	117.1			317.2			270.8			242.1		
Approach LOS	F			F			F			F		
Intersection Delay, s/veh | LOS	254.0						F					

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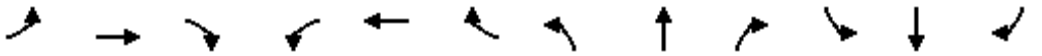

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	606	6	22	674	178	9	16	57	333	13	82
Future Volume (vph)	41	606	6	22	674	178	9	16	57	333	13	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3532		1761	3418			3119			1776	1527
Flt Permitted	0.21	1.00		0.32	1.00			0.92			0.67	1.00
Satd. Flow (perm)	382	3532		584	3418			2876			1241	1527
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	659	7	24	733	193	10	17	62	362	14	89
RTOR Reduction (vph)	0	1	0	0	48	0	0	33	0	0	0	47
Lane Group Flow (vph)	45	665	0	24	878	0	0	56	0	0	376	42
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	19.5	19.5		19.5	19.5			26.0			26.0	26.0
Effective Green, g (s)	19.5	19.5		19.5	19.5			26.0			26.0	26.0
Actuated g/C Ratio	0.35	0.35		0.35	0.35			0.47			0.47	0.47
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	135	1252		207	1211			1359			586	721
v/s Ratio Prot		0.19			c0.26							
v/s Ratio Perm	0.12			0.04				0.02			c0.30	0.03
v/c Ratio	0.33	0.53		0.12	0.73			0.04			0.64	0.06
Uniform Delay, d1	13.0	14.1		11.9	15.4			7.8			11.0	7.9
Progression Factor	1.26	1.22		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.6	0.2		0.3	2.2			0.1			5.3	0.2
Delay (s)	17.0	17.4		12.2	17.6			7.9			16.3	8.0
Level of Service	B	B		B	B			A			B	A
Approach Delay (s)		17.3			17.5			7.9			14.7	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Morse Street
Agency or Co.	IBI Group	E/W Street Name	Morse Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	42	16	15	0	56	16	190	0	20	846	103	0	243	881	19
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	47	18	17	0	62	18	211	0	22	938	114	0	269	977	21
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		82			291			1074			1267	
Entry Volume veh/h		80			285			1053			1242	
Circulating Flow (v_c), pc/h	1308			1007			334			102		
Exiting Flow (v_{ex}), pc/h	401			61			1196			1056		
Capacity (c_{pce}), pc/h		306			413			809			1020	
Capacity (c), veh/h		300			405			793			1000	
v/c Ratio (x)		0.27			0.70			1.33			1.24	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		17.7			31.1			173.4			133.4	
Lane LOS		C			D			F			F	
95% Queue, veh		1.1			5.3			41.9			41.5	
Approach Delay, s/veh	17.7			31.1			173.4			133.4		
Approach LOS	C			D			F			F		
Intersection Delay, s/veh | LOS	134.8						F					

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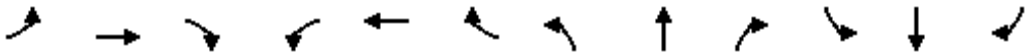
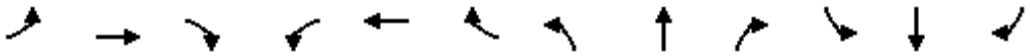


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	325	35	38	197	0	77	0	65	0	0	0
Future Volume (Veh/h)	0	325	35	38	197	0	77	0	65	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	353	38	41	214	0	84	0	71	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	214			391			668	668	372	739	687	214
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	214			391			668	668	372	739	687	214
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			77	100	89	100	100	100
cM capacity (veh/h)	1356			1168			362	366	674	290	357	826

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	391	255	155	0
Volume Left	0	41	84	0
Volume Right	38	0	71	0
cSH	1356	1168	459	1700
Volume to Capacity	0.00	0.04	0.34	0.00
Queue Length 95th (ft)	0	3	37	0
Control Delay (s)	0.0	1.6	16.8	0.0
Lane LOS		A	C	A
Approach Delay (s)	0.0	1.6	16.8	0.0
Approach LOS			C	A

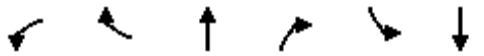
Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	170	59	0	66	0	59	1	18	0	0	0
Future Volume (Veh/h)	0	170	59	0	66	0	59	1	18	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	185	64	0	72	0	64	1	20	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	72			249			289	289	217	310	321	72
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	72			249			289	289	217	310	321	72
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			90	100	98	100	100	100
cM capacity (veh/h)	1528			1317			663	621	823	627	596	990

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	249	72	85	0
Volume Left	0	0	64	0
Volume Right	64	0	20	0
cSH	1528	1317	694	1700
Volume to Capacity	0.00	0.00	0.12	0.00
Queue Length 95th (ft)	0	0	10	0
Control Delay (s)	0.0	0.0	10.9	0.0
Lane LOS			B	A
Approach Delay (s)	0.0	0.0	10.9	0.0
Approach LOS			B	A

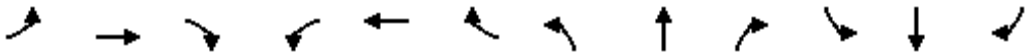
Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	23.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	85	302	27	48	361	27
Future Volume (vph)	85	302	27	48	361	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	92	328	29	52	392	29

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	420	81	421
Volume Left (vph)	92	0	392
Volume Right (vph)	328	52	0
Hadj (s)	-0.39	-0.35	0.22
Departure Headway (s)	4.9	5.3	5.4
Degree Utilization, x	0.57	0.12	0.63
Capacity (veh/h)	702	608	646
Control Delay (s)	14.2	9.1	17.0
Approach Delay (s)	14.2	9.1	17.0
Approach LOS	B	A	C

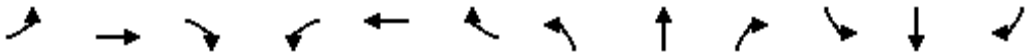
Intersection Summary			
Delay	15.0		
Level of Service	B		
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	238	124	17	186	15	169	19	22	4	14	23
Future Volume (Veh/h)	9	238	124	17	186	15	169	19	22	4	14	23
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	259	135	18	202	16	184	21	24	4	15	25
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	218			394			625	600	326	627	660	210
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	218			394			625	600	326	627	660	210
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			50	95	97	99	96	97
cM capacity (veh/h)	1352			1165			367	405	715	361	374	830

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	404	236	229	44
Volume Left	10	18	184	4
Volume Right	135	16	24	25
cSH	1352	1165	390	542
Volume to Capacity	0.01	0.02	0.59	0.08
Queue Length 95th (ft)	1	1	90	7
Control Delay (s)	0.3	0.8	26.5	12.2
Lane LOS	A	A	D	B
Approach Delay (s)	0.3	0.8	26.5	12.2
Approach LOS			D	B

Intersection Summary				
Average Delay	7.5			
Intersection Capacity Utilization	47.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	249	6	18	207	5	4	4	17	2	2	1
Future Volume (Veh/h)	1	249	6	18	207	5	4	4	17	2	2	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	271	7	20	225	5	4	4	18	2	2	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	230			278			546	546	274	564	548	228
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	230			278			546	546	274	564	548	228
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			99	99	98	100	100	100
cM capacity (veh/h)	1338			1285			441	438	764	418	437	812

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	279	250	26	5
Volume Left	1	20	4	2
Volume Right	7	5	18	1
cSH	1338	1285	622	472
Volume to Capacity	0.00	0.02	0.04	0.01
Queue Length 95th (ft)	0	1	3	1
Control Delay (s)	0.0	0.8	11.0	12.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.0	0.8	11.0	12.7
Approach LOS			B	B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Cassidy Street
Agency or Co.	IBI Group	E/W Street Name	Cassidy Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	135	152	129	0	125	88	31	0	142	817	99	0	123	648	50
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	150	169	143	0	139	98	34	0	157	906	110	0	136	718	55
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			4.9763	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		462			271			1173			909	
Entry Volume veh/h		453			266			1150			891	
Circulating Flow (v_c), pc/h		993			1213			455			394	
Exiting Flow (v_{ex}), pc/h		415			310			1090			1000	
Capacity (c_{pce}), pc/h		419			336			717			923	
Capacity (c), veh/h		410			329			703			905	
v/c Ratio (x)		1.10			0.81			1.64			0.98	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		107.1			48.0			309.0			47.5	
Lane LOS		F			E			F			E	
95% Queue, veh		16.0			6.8			62.8			17.4	
Approach Delay, s/veh	107.1			48.0			309.0			47.5		
Approach LOS	F			E			F			E		
Intersection Delay, s/veh | LOS	166.3						F					

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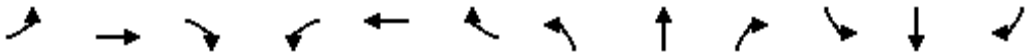
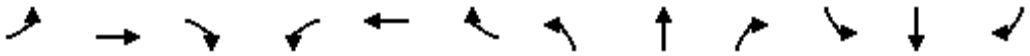


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	222	74	72	100	13	85	82	33	21	32	24
Future Volume (Veh/h)	24	222	74	72	100	13	85	82	33	21	32	24
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	241	80	78	109	14	92	89	36	23	35	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	123			321			648	612	281	686	645	116
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	123			321			648	612	281	686	645	116
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			94			72	76	95	91	90	97
cM capacity (veh/h)	1464			1239			324	376	758	265	360	936

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	347	201	217	84
Volume Left	26	78	92	23
Volume Right	80	14	36	26
cSH	1464	1239	382	397
Volume to Capacity	0.02	0.06	0.57	0.21
Queue Length 95th (ft)	1	5	85	20
Control Delay (s)	0.7	3.5	26.1	16.5
Lane LOS	A	A	D	C
Approach Delay (s)	0.7	3.5	26.1	16.5
Approach LOS			D	C

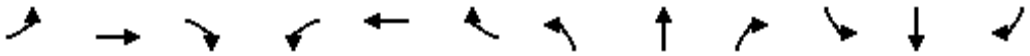
Intersection Summary			
Average Delay	9.4		
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	102	25	30	48	7	33	63	30	9	27	14
Future Volume (vph)	20	102	25	30	48	7	33	63	30	9	27	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	111	27	33	52	8	36	68	33	10	29	15

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	160	93	137	54
Volume Left (vph)	22	33	36	10
Volume Right (vph)	27	8	33	15
Hadj (s)	-0.04	0.05	-0.06	-0.10
Departure Headway (s)	4.4	4.6	4.5	4.6
Degree Utilization, x	0.20	0.12	0.17	0.07
Capacity (veh/h)	777	737	754	730
Control Delay (s)	8.5	8.2	8.4	7.9
Approach Delay (s)	8.5	8.2	8.4	7.9
Approach LOS	A	A	A	A

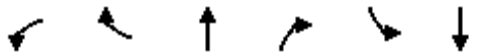
Intersection Summary				
Delay	8.3			
Level of Service	A			
Intersection Capacity Utilization	27.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	167	16	84	72	40	16	110	189	77	23	4
Future Volume (vph)	18	167	16	84	72	40	16	110	189	77	23	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	182	17	91	78	43	17	120	205	84	25	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	219	212	342	113
Volume Left (vph)	20	91	17	84
Volume Right (vph)	17	43	205	4
Hadj (s)	0.01	0.00	-0.32	0.16
Departure Headway (s)	5.5	5.5	5.0	5.8
Degree Utilization, x	0.33	0.32	0.47	0.18
Capacity (veh/h)	599	598	670	546
Control Delay (s)	11.2	11.1	12.4	10.1
Approach Delay (s)	11.2	11.1	12.4	10.1
Approach LOS	B	B	B	B

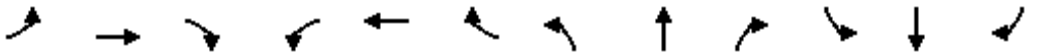
Intersection Summary				
Delay	11.5			
Level of Service	B			
Intersection Capacity Utilization	58.9%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	116	138	9	76	52
Future Volume (vph)	0	116	138	9	76	52
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	126	150	10	83	57

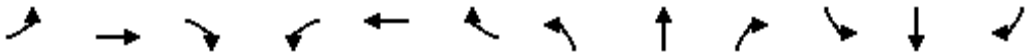
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	126	160	140
Volume Left (vph)	0	0	83
Volume Right (vph)	126	10	0
Hadj (s)	-0.57	0.00	0.15
Departure Headway (s)	4.0	4.3	4.5
Degree Utilization, x	0.14	0.19	0.17
Capacity (veh/h)	829	801	765
Control Delay (s)	7.7	8.4	8.4
Approach Delay (s)	7.7	8.4	8.4
Approach LOS	A	A	A

Intersection Summary			
Delay	8.2		
Level of Service	A		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	154	50	238	122	409	56	743	316	342	624	28
Future Volume (vph)	23	154	50	238	122	409	56	743	316	342	624	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0	5.0	4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	1.00	0.95	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	2006	1863	1555		1803	1794	1770	2111	1509	2006	3986	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	2006	1863	1555		1803	1794	1770	2111	1509	2006	3986	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	167	54	259	133	445	61	808	343	372	678	30
RTOR Reduction (vph)	0	0	49	0	0	141	0	0	112	0	2	0
Lane Group Flow (vph)	25	167	5	0	392	304	61	808	231	372	706	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4						2			
Actuated Green, G (s)	15.1	15.1	15.1		32.0	59.7	8.6	55.1	55.1	27.7	74.2	
Effective Green, g (s)	15.1	15.1	15.1		32.0	59.7	8.6	55.1	55.1	27.7	74.2	
Actuated g/C Ratio	0.10	0.10	0.10		0.21	0.40	0.06	0.37	0.37	0.19	0.50	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0	5.0	4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	203	188	157		387	718	102	780	558	372	1984	
v/s Ratio Prot	0.01	c0.09			c0.22	0.17	0.03	c0.38		c0.19	0.18	
v/s Ratio Perm			0.00						0.15			
v/c Ratio	0.12	0.89	0.03		1.01	0.42	0.60	1.04	0.41	1.00	0.36	
Uniform Delay, d1	60.9	66.1	60.4		58.5	32.2	68.5	47.0	34.9	60.6	22.8	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	35.1	0.0		49.0	0.4	6.1	41.9	2.3	46.7	0.5	
Delay (s)	61.0	101.3	60.4		107.5	32.6	74.7	88.8	37.2	107.3	23.3	
Level of Service	E	F	E		F	C	E	F	D	F	C	
Approach Delay (s)		88.2			67.7			73.5			52.3	
Approach LOS		F			E			E			D	

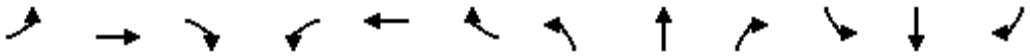
Intersection Summary			
HCM 2000 Control Delay	66.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	149.0	Sum of lost time (s)	19.1
Intersection Capacity Utilization	101.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	893	32	43	859	77	21	0	43	36	14	81
Future Volume (Veh/h)	13	893	32	43	859	77	21	0	43	36	14	81
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	971	35	47	934	84	23	0	47	39	15	88
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	1018			1006			2182	2128	988	2134	2104	976
vC1, stage 1 conf vol							1016	1016		1070	1070	
vC2, stage 2 conf vol							1166	1112		1064	1034	
vCu, unblocked vol	1018			959			2247	2189	940	2194	2162	976
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			93			80	100	84	71	92	71
cM capacity (veh/h)	682			655			116	188	292	135	181	305

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1020	1065	70	142
Volume Left	14	47	23	39
Volume Right	35	84	47	88
cSH	682	655	195	215
Volume to Capacity	0.02	0.07	0.36	0.66
Queue Length 95th (ft)	2	6	38	101
Control Delay (s)	0.7	2.4	33.5	49.4
Lane LOS	A	A	D	E
Approach Delay (s)	0.7	2.4	33.5	49.4
Approach LOS			D	E

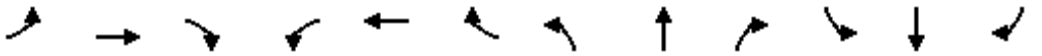
Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	91.4%	ICU Level of Service	F	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	1249	30	72	1228	92	6	5	114	36	5	22
Future Volume (Veh/h)	14	1249	30	72	1228	92	6	5	114	36	5	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	1358	33	78	1335	100	7	5	124	39	5	24
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.92			0.92	0.92	0.92	0.92	0.92	
vC, conflicting volume	1435			1392			2924	2996	1376	3056	2963	1386
vC1, stage 1 conf vol							1406	1406		1541	1541	
vC2, stage 2 conf vol							1518	1591		1514	1422	
vCu, unblocked vol	1435			1383			3045	3124	1365	3188	3087	1386
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			83			90	95	25	0	94	86
cM capacity (veh/h)	473			456			72	98	166	1	81	175

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	15	1391	78	1435	136	68
Volume Left	15	0	78	0	7	39
Volume Right	0	33	0	100	124	24
cSH	473	1700	456	1700	152	2
Volume to Capacity	0.03	0.82	0.17	0.84	0.89	33.75
Queue Length 95th (ft)	2	0	15	0	155	Err
Control Delay (s)	12.9	0.0	14.5	0.0	105.4	Err
Lane LOS	B		B		F	F
Approach Delay (s)	0.1		0.7		105.4	Err
Approach LOS					F	F

Intersection Summary				
Average Delay	222.7			
Intersection Capacity Utilization	87.1%	ICU Level of Service		E
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	1446	0	0	1488	455	0	0	0	0	0	31
Future Volume (Veh/h)	18	1446	0	0	1488	455	0	0	0	0	0	31
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	1572	0	0	1617	495	0	0	0	0	0	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2112			1572			3263	3724	1572	3476	3476	1864
vC1, stage 1 conf vol							1612	1612		1864	1864	
vC2, stage 2 conf vol							1651	2112		1612	1612	
vCu, unblocked vol	2112			1572			3263	3724	1572	3476	3476	1864
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			100			100	100	100	100	100	62
cM capacity (veh/h)	259			419			50	61	136	69	89	91

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	20	1572	0	2112	0	34
Volume Left	20	0	0	0	0	0
Volume Right	0	0	0	495	0	34
cSH	259	1700	1700	1700	1700	91
Volume to Capacity	0.08	0.92	0.00	1.24	0.00	0.38
Queue Length 95th (ft)	6	0	0	0	0	37
Control Delay (s)	20.1	0.0	0.0	0.0	0.0	66.8
Lane LOS	C				A	F
Approach Delay (s)	0.3		0.0		0.0	66.8
Approach LOS					A	F

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	116.0%	ICU Level of Service		H
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	102	0	0	127	107	994	28	127	797	10
Future Volume (Veh/h)	0	0	102	0	0	127	107	994	28	127	797	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	111	0	0	138	116	1080	30	138	866	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	2598	2490	872	2580	2480	1095	877			1110		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2598	2490	872	2580	2480	1095	877			1110		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	68	100	100	47	85			78		
cM capacity (veh/h)	6	19	350	9	20	260	770			629		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	111	138	116	1110	138	877
Volume Left	0	0	116	0	138	0
Volume Right	111	138	0	30	0	11
cSH	350	260	770	1700	629	1700
Volume to Capacity	0.32	0.53	0.15	0.65	0.22	0.52
Queue Length 95th (ft)	33	72	13	0	21	0
Control Delay (s)	20.0	33.5	10.5	0.0	12.3	0.0
Lane LOS	C	D	B		B	
Approach Delay (s)	20.0	33.5	1.0		1.7	
Approach LOS	C	D				

Intersection Summary				
Average Delay	3.9			
Intersection Capacity Utilization	68.5%	ICU Level of Service	C	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Michigan Avenue
Agency or Co.	IBI Group	E/W Street Name	Michigan Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	187	87	79	0	50	11	24	0	25	537	42	0	18	537	48
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	207	96	88	0	55	12	27	0	28	595	47	0	20	595	53
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		391			94			670			668	
Entry Volume veh/h		383			92			657			655	
Circulating Flow (v_c), pc/h		670			830			323			95	
Exiting Flow (v_{ex}), pc/h		163			93			829			738	
Capacity (c_{pce}), pc/h		578			493			818			1028	
Capacity (c), veh/h		567			483			802			1007	
v/c Ratio (x)		0.68			0.19			0.82			0.65	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		22.0			10.2			25.4			13.2	
Lane LOS		C			B			D			B	
95% Queue, veh		5.1			0.7			9.1			5.0	
Approach Delay, s/veh	22.0			10.2			25.4			13.2		
Approach LOS	C			B			D			B		
Intersection Delay, s/veh | LOS	19.4						C					

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HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - West
E/W Street Name	West Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	33	19	36	0	40	19	36	0	36	271	40	0	36	271	33
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	37	21	40	0	44	21	40	0	40	300	44	0	40	300	37
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		98			105			384			377	
Entry Volume veh/h		96			103			376			370	
Circulating Flow (v_c), pc/h	384			377			98			105		
Exiting Flow (v_{ex}), pc/h	105			98			377			384		
Capacity (c_{pce}), pc/h		770			775			1025			1017	
Capacity (c), veh/h		755			760			1004			997	
v/c Ratio (x)		0.13			0.14			0.37			0.37	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.1			6.2			7.6			7.6	
Lane LOS		A			A			A			A	
95% Queue, veh		0.4			0.5			1.8			1.7	
Approach Delay, s/veh	6.1			6.2			7.6			7.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.3						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Kelly
Agency or Co.	IBI Group	E/W Street Name	Kelly Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	28	43	27	0	31	26	197	0	10	317	30	0	180	300	62
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	31	48	30	0	34	29	218	0	11	351	33	0	200	333	69
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		109			281			395			602	
Entry Volume veh/h		107			275			387			590	
Circulating Flow (v_c), pc/h	567			393			279			74		
Exiting Flow (v_{ex}), pc/h	281			109			600			397		
Capacity (c_{pce}), pc/h		641			763			855			1049	
Capacity (c), veh/h		628			748			838			1029	
v/c Ratio (x)		0.17			0.37			0.46			0.57	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.7			9.4			10.2			11.0	
Lane LOS		A			A			B			B	
95% Queue, veh		0.6			1.7			2.5			3.8	
Approach Delay, s/veh	7.7			9.4			10.2			11.0		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh | LOS	10.2						B					

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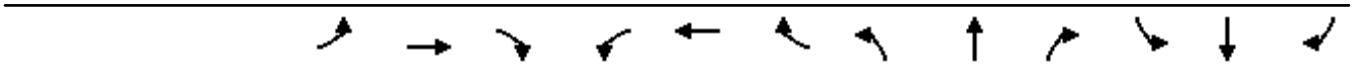


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Future Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				112	0	0	14	1151	0	26	2405	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				738	0	329	92	3173	988	92	2208	988
Arrive On Green				0.20	0.00	0.00	0.05	0.60	0.00	0.05	0.60	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				112	0	0	14	1151	0	26	2405	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Cycle Q Clear(g_c), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				738	0	329	92	3173	988	92	2208	988
V/C Ratio(X)				0.15	0.00	0.00	0.15	0.36	0.00	0.28	1.09	0.00
Avail Cap(c_a), veh/h				738	0	329	92	3173	988	92	2208	988
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				26.4	0.0	0.0	36.4	8.2	0.0	36.6	16.0	0.0
Incr Delay (d2), s/veh				0.4	0.0	0.0	3.5	0.3	0.0	7.5	48.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.0	0.4	4.4	0.0	0.7	38.7	0.0
LnGrp Delay(d),s/veh				26.8	0.0	0.0	39.8	8.5	0.0	44.1	64.3	0.0
LnGrp LOS				C			D	A		D	F	
Approach Vol, veh/h					112			1165			2431	
Approach Delay, s/veh					26.8			8.9			64.1	
Approach LOS					C			A			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	52.0			8.0	52.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	48.0			4.0	48.0		16.0
Max Q Clear Time (g_c+I1), s	3.1	10.9			2.6	50.0		4.0
Green Ext Time (p_c), s	0.0	10.6			0.0	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1123	209	317	1287	0	0
Future Volume (veh/h)	1123	209	317	1287	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	1221	227	345	1399		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	2116	947	805	3313		
Arrive On Green	0.57	0.57	0.22	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	1221	227	345	1399		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	8.4	2.7	3.3	2.5		
Cycle Q Clear(g_c), s	8.4	2.7	3.3	2.5		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2116	947	805	3313		
V/C Ratio(X)	0.58	0.24	0.43	0.42		
Avail Cap(c_a), veh/h	2116	947	805	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.4	4.2	13.3	0.3		
Incr Delay (d2), s/veh	1.2	0.6	1.7	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.4	1.4	1.8	1.2		
LnGrp Delay(d),s/veh	6.6	4.8	15.0	0.7		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1448			1744		
Approach Delay, s/veh	6.3			3.5		
Approach LOS	A			A		

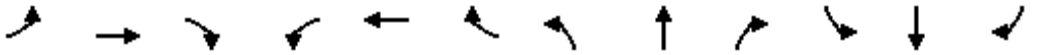
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			13.0	27.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			9.0	23.0				36.0
Max Q Clear Time (g_c+I1), s			5.3	10.4				4.5
Green Ext Time (p_c), s			0.5	7.5				13.7

Intersection Summary	
HCM 2010 Ctrl Delay	4.8
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1740	97	305	1324	156	0
Future Volume (veh/h)	1740	97	305	1324	156	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1891	105	332	1439	170	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1840	823	358	2419	422	376
Arrive On Green	0.50	0.50	0.10	0.66	0.23	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	1891	105	332	1439	170	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	35.0	2.4	6.4	15.4	5.5	0.0
Cycle Q Clear(g_c), s	35.0	2.4	6.4	15.4	5.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1840	823	358	2419	422	376
V/C Ratio(X)	1.03	0.13	0.93	0.59	0.40	0.00
Avail Cap(c_a), veh/h	1840	823	358	2419	422	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.5	9.3	31.2	6.8	22.9	0.0
Incr Delay (d2), s/veh	28.3	0.3	32.3	1.1	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	24.9	1.2	4.8	8.0	3.1	0.0
LnGrp Delay(d),s/veh	45.8	9.7	63.6	7.8	25.8	0.0
LnGrp LOS	F	A	E	A	C	
Approach Vol, veh/h	1996			1771	170	
Approach Delay, s/veh	43.9			18.3	25.8	
Approach LOS	D			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	11.0	39.0				50.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	7.0	35.0				46.0
Max Q Clear Time (g_c+I1), s		7.5	8.4	37.0				17.4
Green Ext Time (p_c), s		0.3	0.0	0.0				13.6

Intersection Summary	
HCM 2010 Ctrl Delay	31.6
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Future Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	680	7	89	633	0	5	0	34	90	0	53
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1244	13	217	1949	872	0	0	0	1158	0	517
Arrive On Green	0.00	0.33	0.33	0.12	0.53	0.00	0.00	0.00	0.00	0.31	0.00	0.31
Sat Flow, veh/h	0	3829	38	1845	3681	1647		0		3690	0	1647
Grp Volume(v), veh/h	0	335	352	89	633	0		0.0		90	0	53
Grp Sat Flow(s),veh/h/ln	0	1840	1930	1845	1840	1647				1845	0	1647
Q Serve(g_s), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Cycle Q Clear(g_c), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	613	643	217	1949	872				1158	0	517
V/C Ratio(X)	0.00	0.55	0.55	0.41	0.32	0.00				0.08	0.00	0.10
Avail Cap(c_a), veh/h	0	613	643	217	1949	872				1158	0	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.9	13.9	20.9	6.8	0.0				12.3	0.0	12.4
Incr Delay (d2), s/veh	0.0	3.5	3.3	5.6	0.4	0.0				0.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.4	4.6	1.5	2.6	0.0				0.5	0.0	0.6
LnGrp Delay(d),s/veh	0.0	17.3	17.2	26.5	7.3	0.0				12.4	0.0	12.8
LnGrp LOS		B	B	C	A					B		B
Approach Vol, veh/h		687			722						143	
Approach Delay, s/veh		17.3			9.6						12.6	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			10.0	21.0		20.0		31.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			6.0	17.0		16.0		27.0
Max Q Clear Time (g_c+I1), s			4.3	9.6		3.2		7.0
Green Ext Time (p_c), s			0.0	2.5		0.3		4.3

Intersection Summary	
HCM 2010 Ctrl Delay	13.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Future Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	195	751	10	30	1102	325	10	2	16	202	169	79
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	1209	16	115	1058	473	329	66	350	369	250	117
Arrive On Green	0.10	0.32	0.32	0.06	0.29	0.29	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1845	3719	50	1845	3681	1647	1550	310	1647	1845	1250	584
Grp Volume(v), veh/h	195	372	389	30	1102	325	12	0	16	202	0	248
Grp Sat Flow(s),veh/h/ln	1845	1840	1929	1845	1840	1647	1860	0	1647	1845	0	1834
Q Serve(g_s), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Cycle Q Clear(g_c), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Prop In Lane	1.00		0.03	1.00		1.00	0.83		1.00	1.00		0.32
Lane Grp Cap(c), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
V/C Ratio(X)	1.06	0.62	0.62	0.26	1.04	0.69	0.03	0.00	0.05	0.55	0.00	0.68
Avail Cap(c_a), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	22.8	22.8	35.7	28.5	25.3	25.0	0.0	25.0	28.7	0.0	29.6
Incr Delay (d2), s/veh	82.1	4.8	4.6	5.4	39.0	7.9	0.1	0.0	0.2	5.7	0.0	9.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	7.7	8.0	0.8	17.3	7.4	0.2	0.0	0.3	4.6	0.0	6.0
LnGrp Delay(d),s/veh	118.1	27.6	27.4	41.1	67.5	33.2	25.1	0.0	25.3	34.5	0.0	39.2
LnGrp LOS	F	C	C	D	F	C	C		C	C		D
Approach Vol, veh/h		956			1457			28			450	
Approach Delay, s/veh		46.0			59.3			25.2			37.1	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	30.0		20.0	12.0	27.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	26.0		16.0	8.0	23.0
Max Q Clear Time (g_c+I1), s		2.6	3.2	15.7		12.0	10.0	25.0
Green Ext Time (p_c), s		0.0	0.0	3.5		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	51.1
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Future Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	838	272	98	1080	483	394	413	351	394	413	351
Arrive On Green	0.07	0.31	0.31	0.05	0.29	0.29	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1845	2732	888	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	66	634	617	96	832	201	250	306	153	368	411	424
Grp Sat Flow(s),veh/h/ln	1845	1840	1780	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Cycle Q Clear(g_c), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Prop In Lane	1.00		0.50	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
V/C Ratio(X)	0.54	1.12	1.13	0.98	0.77	0.42	0.64	0.74	0.44	0.93	0.99	1.21
Avail Cap(c_a), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.9	26.0	26.0	35.5	24.2	21.3	26.8	27.6	25.6	29.0	29.5	29.5
Incr Delay (d2), s/veh	15.8	76.4	79.7	84.3	5.3	2.6	7.6	11.3	3.9	31.6	42.9	116.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	23.6	23.3	4.3	8.7	3.7	5.6	7.2	3.1	10.9	13.4	18.6
LnGrp Delay(d),s/veh	49.6	102.4	105.7	119.7	29.5	24.0	34.5	38.9	29.5	60.6	72.4	146.4
LnGrp LOS	D	F	F	F	C	C	C	D	C	E	E	F
Approach Vol, veh/h		1317			1129			709			1203	
Approach Delay, s/veh		101.3			36.2			35.3			94.9	
Approach LOS		F			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	27.0		20.0	9.0	26.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	23.0		16.0	5.0	22.0
Max Q Clear Time (g_c+I1), s		13.1	5.9	25.0		18.0	4.6	17.5
Green Ext Time (p_c), s		1.0	0.0	0.0		0.0	0.0	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	71.9
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Future Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	85	8	8	93	10	4	5	9	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	24%	21%	7%
Vol Thru, %	29%	72%	84%
Vol Right, %	47%	6%	9%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	17	108	102
LT Vol	4	23	7
Through Vol	5	78	86
RT Vol	8	7	9
Lane Flow Rate	18	117	111
Geometry Grp	1	1	1
Degree of Util (X)	0.021	0.132	0.124
Departure Headway (Hd)	4.088	4.052	4.014
Convergence, Y/N	Yes	Yes	Yes
Cap	860	884	891
Service Time	2.187	2.083	2.047
HCM Lane V/C Ratio	0.021	0.132	0.125
HCM Control Delay	7.3	7.7	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.4

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Future Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	212	60	34	38	0	0	0	0	30	0	50

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	212	0	0			318	318	38
Stage 1	-	-	-	-	-	-			106	106	-
Stage 2	-	-	-	-	-	-			212	212	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1358	-	0			675	598	1034
Stage 1	0	-	-	-	-	0			918	807	-
Stage 2	0	-	-	-	-	0			823	727	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1358	-	-			657	0	1034
Mov Cap-2 Maneuver	-	-	-	-	-	-			657	0	-
Stage 1	-	-	-	-	-	-			894	0	-
Stage 2	-	-	-	-	-	-			823	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	3.6	9.5
HCM LOS			A

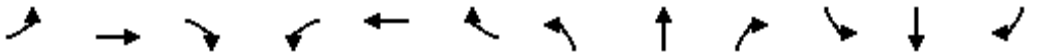
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1358	-	657	1034
HCM Lane V/C Ratio	-	-	0.025	-	0.046	0.048
HCM Control Delay (s)	-	-	7.7	0	10.7	8.7
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	945	137	935	1632	56	1428
Future Volume (veh/h)	945	137	935	1632	56	1428
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1027	0	1016	1774	61	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1302	583	1211	1401	397	624
Arrive On Green	0.35	0.00	0.34	0.72	0.22	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	1027	0	1016	1774	61	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	32.5	0.0	34.1	94.0	3.5	0.0
Cycle Q Clear(g_c), s	32.5	0.0	34.1	94.0	3.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1302	583	1211	1401	397	624
V/C Ratio(X)	0.79	0.00	0.84	1.27	0.15	0.00
Avail Cap(c_a), veh/h	1302	583	1211	1401	397	624
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.6	0.0	39.7	18.0	41.4	0.0
Incr Delay (d2), s/veh	4.9	0.0	7.0	125.7	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.4	0.0	18.0	98.3	1.9	0.0
LnGrp Delay(d),s/veh	42.5	0.0	46.8	143.7	42.2	0.0
LnGrp LOS	D		D	F	D	
Approach Vol, veh/h	1027			2790	61	
Approach Delay, s/veh	42.5			108.4	42.2	
Approach LOS	D			F	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		32.0	48.0	50.0				98.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		28.0	44.0	46.0				94.0
Max Q Clear Time (g_c+I1), s		5.5	36.1	34.5				96.0
Green Ext Time (p_c), s		0.1	2.8	5.5				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	89.9
HCM 2010 LOS	F

Appendix K.1 – Analysis Output Sheets (Future with Project Alternative 1)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	81	61	93	301	570	169	18	141	83	23	70
Future Volume (vph)	90	81	61	93	301	570	169	18	141	83	23	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3143	1441		1782	1583		1793	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3143	1441		1782	1583		1793	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	88	66	101	327	620	184	20	153	90	25	76
RTOR Reduction (vph)	0	0	58	0	229	256	0	0	91	0	0	58
Lane Group Flow (vph)	98	88	8	101	408	54	0	204	62	0	115	18
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Effective Green, g (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Actuated g/C Ratio	0.07	0.11	0.11	0.11	0.17	0.17		0.29	0.29		0.23	0.23
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	132	212	180	199	546	250		518	460		419	369
v/s Ratio Prot	c0.06	0.05		c0.06	c0.13			c0.11			c0.06	
v/s Ratio Perm			0.00			0.04			0.04			0.01
v/c Ratio	0.74	0.42	0.04	0.51	0.75	0.22		0.39	0.13		0.27	0.05
Uniform Delay, d1	33.4	30.3	29.0	30.7	28.9	26.1		20.9	19.3		23.1	21.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	20.0	0.5	0.0	2.0	4.9	0.2		2.2	0.6		1.6	0.2
Delay (s)	53.3	30.8	29.1	32.8	33.7	26.2		23.1	19.9		24.7	22.1
Level of Service	D	C	C	C	C	C		C	B		C	C
Approach Delay (s)		39.1			31.4			21.7			23.7	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	18.3
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	413	0	377	0	0	176	469	0	120	164	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	0	0	458	0	410	0	0	195	520	0	133	182	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		0		0	458	410		195	520	133	182	
Entry Volume veh/h		0		0	449	410		191	510	130	178	
Circulating Flow (Vc), pc/h	773			195			133			458		
Exiting Flow (Vex), pc/h	133			0			195			640		
Capacity (cPCE), pc/h		522		976	986			1030		802	820	
Capacity (c), veh/h		511		957	967			1009		786	804	
v/c Ratio (X)		0.00		0.00	0.46			0.19		0.17	0.22	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.0		3.8	9.2	0.0		5.3	0.0	6.3	6.9	
Lane LOS		A		A	A	A		A	A	A	A	
95% Queue		0.0		0.0	2.5			0.7		0.6	0.8	
Approach Delay, s/veh				4.8			1.5			6.6		
Approach LOS				A			A			A		
Intersection Delay, s/veh / LOS	3.9						A					

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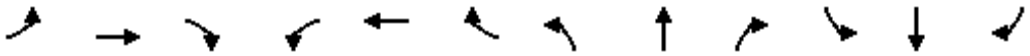
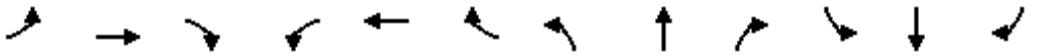


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	22	4	43	28	84	12	56	62	125	77	6
Future Volume (vph)	2	22	4	43	28	84	12	56	62	125	77	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	24	4	47	30	91	13	61	67	136	84	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	30	168	141	227
Volume Left (vph)	2	47	13	136
Volume Right (vph)	4	91	67	7
Hadj (s)	-0.03	-0.24	-0.23	0.14
Departure Headway (s)	5.0	4.6	4.4	4.7
Degree Utilization, x	0.04	0.21	0.17	0.30
Capacity (veh/h)	652	727	766	731
Control Delay (s)	8.2	8.8	8.4	9.6
Approach Delay (s)	8.2	8.8	8.4	9.6
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	40.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	173	17	47	9	33	67	44	287	20	26	394	99
Future Volume (vph)	173	17	47	9	33	67	44	287	20	26	394	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1781	1583		1701		1770	1844		1770	1863	1583
Flt Permitted		0.63	1.00		0.98		0.46	1.00		0.53	1.00	1.00
Satd. Flow (perm)		1174	1583		1668		848	1844		993	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	188	18	51	10	36	73	48	312	22	28	428	108
RTOR Reduction (vph)	0	0	37	0	53	0	0	3	0	0	0	38
Lane Group Flow (vph)	0	206	14	0	66	0	48	331	0	28	428	70
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		22.0	22.0		22.0		50.8	50.8		52.0	52.0	52.0
Effective Green, g (s)		22.0	22.0		22.0		50.8	50.8		52.0	52.0	52.0
Actuated g/C Ratio		0.28	0.28		0.28		0.63	0.63		0.65	0.65	0.65
Clearance Time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		7.0	7.0	7.0
Lane Grp Cap (vph)		322	435		458		538	1170		645	1210	1028
v/s Ratio Prot								0.18			c0.23	
v/s Ratio Perm		c0.18	0.01		0.04		0.06			0.03		0.04
v/c Ratio		0.64	0.03		0.14		0.09	0.28		0.04	0.35	0.07
Uniform Delay, d1		25.5	21.2		21.9		5.6	6.5		5.0	6.4	5.1
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		7.9	0.1		0.5		0.3	0.6		0.1	0.8	0.1
Delay (s)		33.4	21.3		22.4		6.0	7.1		5.2	7.2	5.3
Level of Service		C	C		C		A	A		A	A	A
Approach Delay (s)		31.0			22.4			7.0			6.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	13	10	9	0	23	14	22	0	7	281	28	0	63	334	13
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	14	11	10	0	26	16	24	0	8	312	31	0	70	370	14
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		35			66			351			454	
Entry Volume veh/h		34			65			344			445	
Circulating Flow (Vc), pc/h		466			334			95			50	
Exiting Flow (Vex), pc/h		112			38			350			406	
Capacity (cPCE), pc/h		709			809			1028			1075	
Capacity (c), veh/h		695			793			1007			1054	
v/c Ratio (X)		0.05			0.08			0.34			0.42	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.7			5.3			7.1			8.0	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.3			1.5			2.1	
Approach Delay, s/veh	5.7			5.3			7.1			8.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	7.4						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/12/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	7	11	11	0	12	17	18	0	8	326	13	0	13	284	22
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	8	12	12	0	13	19	20	0	9	361	14	0	14	315	24
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		32			52			384			353	
Entry Volume veh/h		31			51			376			346	
Circulating Flow (Vc), pc/h		342			378			34			41	
Exiting Flow (Vex), pc/h		40			52			389			340	
Capacity (cPCE), pc/h		803			774			1092			1085	
Capacity (c), veh/h		787			759			1071			1063	
v/c Ratio (X)		0.04			0.07			0.35			0.33	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.0			5.4			6.9			6.6	
Lane LOS		A			A			A			A	
95% Queue		0.1			0.2			1.6			1.4	
Approach Delay, s/veh	5.0			5.4			6.9			6.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.6						A					

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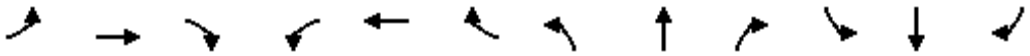
HCM Unsignalized Intersection Capacity Analysis
7: Horne St & Pier View Way

11/17/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	3	19	9	5	4	86	216	3	5	148	7
Future Volume (vph)	2	3	19	9	5	4	86	216	3	5	148	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	3	21	10	5	4	93	235	3	5	161	8

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	5	21	19	211	121	86	89
Volume Left (vph)	2	0	10	93	0	5	0
Volume Right (vph)	0	21	4	0	3	0	8
Hadj (s)	0.23	-0.67	0.01	0.25	0.02	0.06	-0.03
Departure Headway (s)	5.9	5.0	5.6	5.0	4.8	5.0	4.9
Degree Utilization, x	0.01	0.03	0.03	0.29	0.16	0.12	0.12
Capacity (veh/h)	563	660	588	705	737	704	720
Control Delay (s)	7.7	6.9	8.8	8.9	7.5	7.4	7.3
Approach Delay (s)	7.1		8.8	8.4		7.4	
Approach LOS	A		A	A		A	

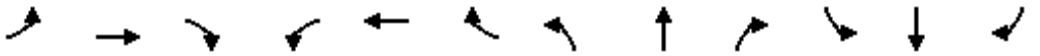
Intersection Summary				
Delay	8.0			
Level of Service	A			
Intersection Capacity Utilization	30.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	129	57	126	91	33	111
Future Volume (vph)	129	57	126	91	33	111
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	140	62	137	99	36	121

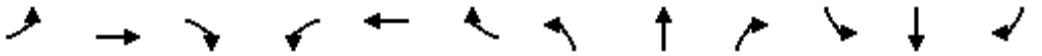
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	140	62	236	157
Volume Left (vph)	140	0	0	36
Volume Right (vph)	0	62	99	0
Hadj (s)	0.53	-0.67	-0.22	0.08
Departure Headway (s)	6.0	4.8	4.4	4.8
Degree Utilization, x	0.23	0.08	0.29	0.21
Capacity (veh/h)	569	708	776	708
Control Delay (s)	9.5	7.0	9.3	9.1
Approach Delay (s)	8.8		9.3	9.1
Approach LOS	A		A	A

Intersection Summary			
Delay	9.0		
Level of Service	A		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		



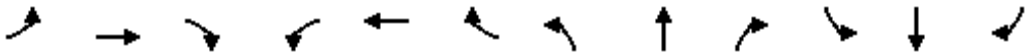
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	132	38	169	33	0	0	0	0	31	41
Future Volume (vph)	18	0	132	38	169	33	0	0	0	0	31	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.98						0.91	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3452						3237	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3452						3237	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	0	143	41	184	36	0	0	0	0	34	45
RTOR Reduction (vph)	0	0	130	16	14	0	0	0	0	0	42	0
Lane Group Flow (vph)	20	0	13	25	206	0	0	0	0	0	37	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	5.3		5.3	37.1	37.1						4.1	
Effective Green, g (s)	5.3		5.3	37.1	37.1						4.1	
Actuated g/C Ratio	0.09		0.09	0.62	0.62						0.07	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	156		246	1094	2134						221	
v/s Ratio Prot	c0.01		0.00	0.01	c0.06						c0.01	
v/s Ratio Perm												
v/c Ratio	0.13		0.05	0.02	0.10						0.17	
Uniform Delay, d1	25.2		25.0	4.4	4.6						26.3	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.4		0.1	0.0	0.1						0.4	
Delay (s)	25.6		25.1	4.5	4.7						26.7	
Level of Service	C		C	A	A						C	
Approach Delay (s)		25.2			4.7			0.0			26.7	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	144	213	73	67	585	0	0	333	30
Future Volume (vph)	0	0	0	144	213	73	67	585	0	0	333	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1525	1770	1863			1767	1460
Flt Permitted				0.95	1.00	1.00	0.37	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1525	686	1863			1767	1460
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	157	232	79	73	636	0	0	362	33
RTOR Reduction (vph)	0	0	0	0	0	55	0	0	0	0	1	22
Lane Group Flow (vph)	0	0	0	157	232	24	73	636	0	0	364	8
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.1	18.1	18.1	32.7	32.7			17.1	17.1
Effective Green, g (s)				18.1	18.1	18.1	32.7	32.7			17.1	17.1
Actuated g/C Ratio				0.30	0.30	0.30	0.54	0.54			0.28	0.28
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				526	1053	453	557	1001			496	410
v/s Ratio Prot				c0.09	0.07		0.02	c0.34			c0.21	
v/s Ratio Perm						0.02	0.05					0.01
v/c Ratio				0.30	0.22	0.05	0.13	0.64			0.73	0.02
Uniform Delay, d1				16.5	16.0	15.2	10.8	9.9			19.8	15.8
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				1.4	0.5	0.2	0.1	1.5			5.9	0.0
Delay (s)				17.9	16.5	15.4	11.0	11.4			25.7	15.8
Level of Service				B	B	B	B	B			C	B
Approach Delay (s)		0.0			16.8			11.3			25.0	
Approach LOS		A			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	115	1	124	433	199	11	24	188	134	47	6
Future Volume (vph)	23	115	1	124	433	199	11	24	188	134	47	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3535		1770	3539	1583		1834	1583	1681	1714	
Flt Permitted	0.42	1.00		0.67	1.00	1.00		0.94	1.00	0.73	0.90	
Satd. Flow (perm)	779	3535		1252	3539	1583		1754	1583	1296	1572	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	125	1	135	471	216	12	26	204	146	51	7
RTOR Reduction (vph)	0	1	0	0	0	160	0	0	85	0	3	0
Lane Group Flow (vph)	25	125	0	135	471	56	0	38	119	101	100	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	15.9	15.9		15.5	15.5	15.5		34.9	34.9	34.9	34.9	
Effective Green, g (s)	15.9	15.9		15.5	15.5	15.5		34.9	34.9	34.9	34.9	
Actuated g/C Ratio	0.27	0.27		0.26	0.26	0.26		0.58	0.58	0.58	0.58	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	206	936		323	914	408		1020	920	753	914	
v/s Ratio Prot		0.04			c0.13							
v/s Ratio Perm	0.03			0.11		0.04		0.02	0.07	c0.08	0.06	
v/c Ratio	0.12	0.13		0.42	0.52	0.14		0.04	0.13	0.13	0.11	
Uniform Delay, d1	16.7	16.8		18.5	19.0	17.1		5.4	5.7	5.7	5.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.1		1.0	0.6	0.2		0.1	0.3	0.4	0.2	
Delay (s)	17.1	16.9		19.5	19.6	17.3		5.4	6.0	6.1	5.8	
Level of Service	B	B		B	B	B		A	A	A	A	
Approach Delay (s)		16.9			19.0			5.9			6.0	
Approach LOS		B			B			A			A	

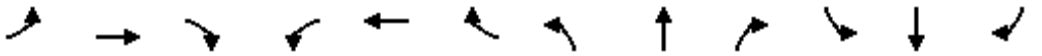
Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	89	6	21	31	6	8
Future Volume (Veh/h)	89	6	21	31	6	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	7	23	34	7	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			104		180	100
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			104		180	100
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	99
cM capacity (veh/h)			1488		796	955

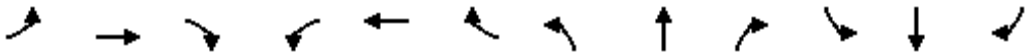
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	104	57	16
Volume Left	0	23	7
Volume Right	7	0	9
cSH	1700	1488	878
Volume to Capacity	0.06	0.02	0.02
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	3.1	9.2
Lane LOS		A	A
Approach Delay (s)	0.0	3.1	9.2
Approach LOS			A

Intersection Summary			
Average Delay		1.8	
Intersection Capacity Utilization		19.5%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	55	96	0	0	0	27	222	64	75	215	53
Future Volume (vph)	89	55	96	0	0	0	27	222	64	75	215	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.94				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1494				1770	1863	1551	1770	1863	1515
Flt Permitted	0.95	1.00	1.00				0.61	1.00	1.00	0.42	1.00	1.00
Satd. Flow (perm)	1770	1863	1494				1142	1863	1551	783	1863	1515
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	60	104	0	0	0	29	241	70	82	234	58
RTOR Reduction (vph)	0	0	55	0	0	0	0	0	51	0	0	36
Lane Group Flow (vph)	97	60	49	0	0	0	29	241	19	82	234	22
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	28.0	28.0	28.0				16.0	16.0	16.0	23.2	23.2	23.2
Effective Green, g (s)	28.0	28.0	28.0				16.0	16.0	16.0	23.2	23.2	23.2
Actuated g/C Ratio	0.47	0.47	0.47				0.27	0.27	0.27	0.39	0.39	0.39
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	826	869	697				304	496	413	355	720	585
v/s Ratio Prot	c0.05	0.03						c0.13		0.01	c0.13	
v/s Ratio Perm			0.03				0.03		0.01	0.08		0.01
v/c Ratio	0.12	0.07	0.07				0.10	0.49	0.05	0.23	0.33	0.04
Uniform Delay, d1	9.0	8.8	8.8				16.6	18.5	16.3	12.2	12.9	11.5
Progression Factor	1.00	1.00	1.00				0.71	0.70	0.27	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	0.2				0.6	3.4	0.2	0.3	1.2	0.1
Delay (s)	9.3	9.0	9.0				12.4	16.3	4.6	12.5	14.1	11.6
Level of Service	A	A	A				B	B	A	B	B	B
Approach Delay (s)		9.1			0.0			13.6			13.4	
Approach LOS		A			A			B			B	

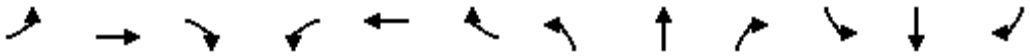
Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	209	10	0	0	0	0	4	17	20	7	0
Future Volume (Veh/h)	10	209	10	0	0	0	0	4	17	20	7	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	227	11	0	0	0	0	4	18	22	8	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			238			258	254	119	156	260	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			238			258	254	119	156	260	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	98	97	99	100
cM capacity (veh/h)	1622			1326			664	644	910	773	639	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	124	124	22	30
Volume Left	11	0	0	22
Volume Right	0	11	18	0
cSH	1622	1700	846	732
Volume to Capacity	0.01	0.07	0.03	0.04
Queue Length 95th (ft)	1	0	2	3
Control Delay (s)	0.7	0.0	9.4	10.1
Lane LOS	A		A	B
Approach Delay (s)	0.3		9.4	10.1
Approach LOS			A	B

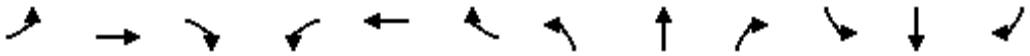
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	21.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	24	473	5	0	0	0	0	4	21	14	12	0
Future Volume (vph)	24	473	5	0	0	0	0	4	21	14	12	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	514	5	0	0	0	0	4	23	15	13	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	283	262	27	28
Volume Left (vph)	26	0	0	15
Volume Right (vph)	0	5	23	0
Hadj (s)	0.08	0.02	-0.48	0.14
Departure Headway (s)	4.7	4.7	4.6	5.2
Degree Utilization, x	0.37	0.34	0.03	0.04
Capacity (veh/h)	755	761	730	643
Control Delay (s)	9.3	8.8	7.7	8.4
Approach Delay (s)	9.1		7.7	8.4
Approach LOS	A		A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	28.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	97	187	9	40	0	97	0	47	29	0	0	0
Future Volume (vph)	97	187	9	40	0	97	0	47	29	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	105	203	10	43	0	105	0	51	32	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	105	213	148	83
Volume Left (vph)	105	0	43	0
Volume Right (vph)	0	10	105	32
Hadj (s)	0.53	0.00	-0.33	-0.20
Departure Headway (s)	5.4	4.8	4.2	4.7
Degree Utilization, x	0.16	0.29	0.17	0.11
Capacity (veh/h)	660	730	821	703
Control Delay (s)	8.1	8.5	8.1	8.3
Approach Delay (s)	8.4		8.1	8.3
Approach LOS	A		A	A

Intersection Summary				
Delay	8.3			
Level of Service	A			
Intersection Capacity Utilization	32.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	14	0	0	51	14	224	32	23	232	6
Future Volume (Veh/h)	0	0	14	0	0	51	14	224	32	23	232	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	15	0	0	55	15	243	35	25	252	7
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked												
vC, conflicting volume	640	628	262	614	614	268	266			285		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	640	628	262	614	614	268	266			285		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	93	99			98		
cM capacity (veh/h)	346	382	772	380	389	765	1290			1267		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	15	55	15	278	25	259
Volume Left	0	0	15	0	25	0
Volume Right	15	55	0	35	0	7
cSH	772	765	1290	1700	1267	1700
Volume to Capacity	0.02	0.07	0.01	0.16	0.02	0.15
Queue Length 95th (ft)	1	6	1	0	2	0
Control Delay (s)	9.8	10.1	7.8	0.0	7.9	0.0
Lane LOS	A	B	A		A	
Approach Delay (s)	9.8	10.1	0.4		0.7	
Approach LOS	A	B				

Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	23.8%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	2	25	0	59	9	4	0	18	226	11	0	3	235	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	16	2	28	0	65	10	4	0	20	251	12	0	3	261	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		46			79			283			284	
Entry Volume veh/h		45			77			277			278	
Circulating Flow (Vc), pc/h	329			287			21			95		
Exiting Flow (Vex), pc/h	17			50			271			354		
Capacity (cPCE), pc/h		813			848			1107			1028	
Capacity (c), veh/h		797			831			1085			1007	
v/c Ratio (X)		0.06			0.09			0.26			0.28	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.1			5.2			5.7			6.3	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.3			1.0			1.1	
Approach Delay, s/veh	5.1			5.2			5.7			6.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	5.9						A					

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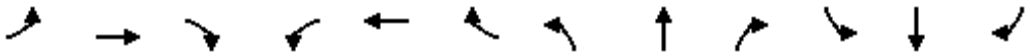
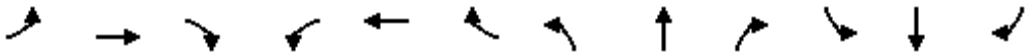


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	30	16	25	4	79	3	136	39	93	93	1
Future Volume (vph)	20	30	16	25	4	79	3	136	39	93	93	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	33	17	27	4	86	3	148	42	101	101	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	72	117	193	203
Volume Left (vph)	22	27	3	101
Volume Right (vph)	17	86	42	1
Hadj (s)	-0.05	-0.36	-0.09	0.13
Departure Headway (s)	5.0	4.6	4.5	4.7
Degree Utilization, x	0.10	0.15	0.24	0.27
Capacity (veh/h)	657	713	756	722
Control Delay (s)	8.5	8.4	9.0	9.4
Approach Delay (s)	8.5	8.4	9.0	9.4
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	37.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	202	22	4	93	15	11	23	27	20	32	11
Future Volume (Veh/h)	8	202	22	4	93	15	11	23	27	20	32	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	220	24	4	101	16	12	25	29	22	35	12
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	131			251			404	396	239	422	400	124
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	131			251			404	396	239	422	400	124
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			98	95	96	95	93	99
cM capacity (veh/h)	1437			1307			507	527	795	487	524	915

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	253	121	66	69
Volume Left	9	4	12	22
Volume Right	24	16	29	12
cSH	1437	1307	613	552
Volume to Capacity	0.01	0.00	0.11	0.13
Queue Length 95th (ft)	0	0	9	11
Control Delay (s)	0.3	0.3	11.6	12.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	11.6	12.5
Approach LOS			B	B

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	28.1%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Wisconsin Avenue
Agency or Co.	IBI Group	E/W Street Name	Wisconsin Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Period	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	51	56	131	0	93	30	29	0	64	234	67	0	18	257	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	57	62	145	0	103	33	32	0	71	259	74	0	20	285	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		264			168			404			324	
Entry Volume veh/h		259			165			396			318	
Circulating Flow (Vc), pc/h		408			387			139			207	
Exiting Flow (Vex), pc/h		156			123			348			533	
Capacity (cPCE), pc/h		751			767			983			919	
Capacity (c), veh/h		737			752			964			901	
v/c Ratio (X)		0.35			0.22			0.41			0.35	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.3			7.2			8.4			7.9	
Lane LOS		A			A			A			A	
95% Queue		1.6			0.8			2.0			1.6	
Approach Delay, s/veh	9.3			7.2			8.4			7.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	8.3						A					

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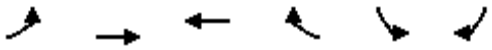
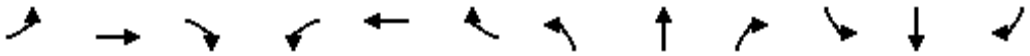


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	221	214	5	17	15
Future Volume (Veh/h)	9	221	214	5	17	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	240	233	5	18	16
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	246				504	244
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	246				504	244
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	98
cM capacity (veh/h)	1311				519	788

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	250	238	34
Volume Left	10	0	18
Volume Right	0	5	16
cSH	1311	1700	619
Volume to Capacity	0.01	0.14	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.4	0.0	11.2
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	11.2
Approach LOS			B

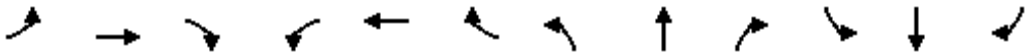
Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		29.3%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	206	9	20	195	11	6	5	14	36	1	6
Future Volume (Veh/h)	7	206	9	20	195	11	6	5	14	36	1	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	224	10	22	212	12	7	5	15	39	1	7
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	226			234			516	515	229	526	514	222
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	226			234			516	515	229	526	514	222
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			98	99	98	91	100	99
cM capacity (veh/h)	1340			1333			455	452	810	441	453	815

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	242	246	27	47
Volume Left	8	22	7	39
Volume Right	10	12	15	7
cSH	1340	1333	601	473
Volume to Capacity	0.01	0.02	0.04	0.10
Queue Length 95th (ft)	0	1	4	8
Control Delay (s)	0.3	0.8	11.3	13.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	11.3	13.4
Approach LOS			B	B

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	33.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	114	188	71	144	0	101	0	36	0	0	0
Future Volume (vph)	0	114	188	71	144	0	101	0	36	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	124	204	77	157	0	110	0	39	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	328	234	149	0
Volume Left (vph)	0	77	110	0
Volume Right (vph)	204	0	39	0
Hadj (s)	-0.34	0.10	0.02	0.00
Departure Headway (s)	4.3	4.8	5.2	5.4
Degree Utilization, x	0.39	0.31	0.21	0.00
Capacity (veh/h)	815	720	634	900
Control Delay (s)	9.9	9.9	9.6	8.4
Approach Delay (s)	9.9	9.9	9.6	0.0
Approach LOS	A	A	A	A

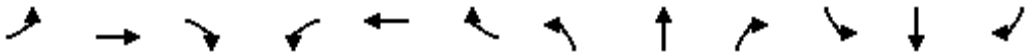
Intersection Summary				
Delay	9.8			
Level of Service	A			
Intersection Capacity Utilization	51.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	48	67	85	30	78	102
Future Volume (vph)	48	67	85	30	78	102
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	73	92	33	85	111

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	125	125	196
Volume Left (vph)	52	0	85
Volume Right (vph)	73	33	0
Hadj (s)	-0.23	-0.12	0.12
Departure Headway (s)	4.4	4.3	4.5
Degree Utilization, x	0.15	0.15	0.24
Capacity (veh/h)	760	803	776
Control Delay (s)	8.2	8.0	8.9
Approach Delay (s)	8.2	8.0	8.9
Approach LOS	A	A	A

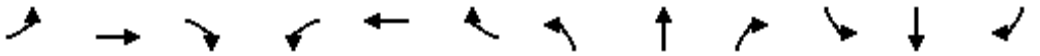
Intersection Summary			
Delay	8.4		
Level of Service	A		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	246	1	6	198	36	7	9	12	36	15	9
Future Volume (Veh/h)	7	246	1	6	198	36	7	9	12	36	15	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	267	1	7	215	39	8	10	13	39	16	10
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.93						0.93	0.93		0.93	0.93	0.93
vC, conflicting volume	257			279			565	566	286	561	546	242
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	164			279			495	496	286	491	476	148
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	98	98	91	96	99
cM capacity (veh/h)	1313			1272			420	432	741	427	444	832

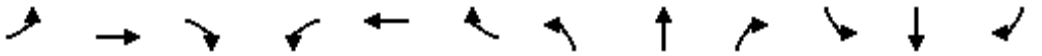
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	276	261	31	65
Volume Left	8	7	8	39
Volume Right	1	39	13	10
cSH	1313	1272	519	466
Volume to Capacity	0.01	0.01	0.06	0.14
Queue Length 95th (ft)	0	0	5	12
Control Delay (s)	0.3	0.3	12.4	14.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	12.4	14.0
Approach LOS			B	B

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	30.9%	ICU Level of Service	A	
Analysis Period (min)	15			



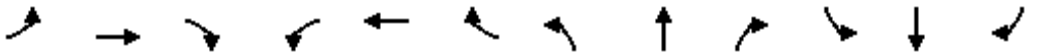
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	139	78	108	141	98	40	202	57	107	256	16
Future Volume (vph)	22	139	78	108	141	98	40	202	57	107	256	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	10	11	11	16	16	16
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1850	1534	1681	1763	1794	1652	3295		2006	2093	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1850	1534	1681	1763	1794	1652	3295		2006	2093	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	151	85	117	153	107	43	220	62	116	278	17
RTOR Reduction (vph)	0	0	72	0	0	89	0	30	0	0	2	0
Lane Group Flow (vph)	0	175	13	105	165	18	43	252	0	116	293	0
Confl. Peds. (#/hr)			10	10					3			
Confl. Bikes (#/hr)			4						3			
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		11.9	11.9	13.1	13.1	13.1	4.1	25.8		10.4	32.1	
Effective Green, g (s)		11.9	11.9	13.1	13.1	13.1	4.1	25.8		10.4	32.1	
Actuated g/C Ratio		0.15	0.15	0.16	0.16	0.16	0.05	0.32		0.13	0.40	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		275	228	275	288	293	84	1062		260	839	
v/s Ratio Prot		c0.09		0.06	c0.09		0.03	0.08		c0.06	c0.14	
v/s Ratio Perm			0.01			0.01						
v/c Ratio		0.64	0.06	0.38	0.57	0.06	0.51	0.24		0.45	0.35	
Uniform Delay, d1		32.0	29.2	29.8	30.9	28.2	37.0	19.9		32.1	16.7	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.5	0.0	1.0	3.0	0.1	2.2	0.5		1.2	1.1	
Delay (s)		35.5	29.3	30.9	33.8	28.4	39.2	20.4		33.4	17.8	
Level of Service		D	C	C	C	C	D	C		C	B	
Approach Delay (s)		33.5			31.5			22.9			22.2	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



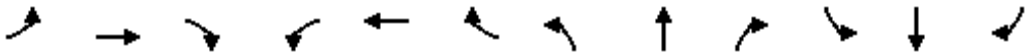
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	345	0	16	445	87	8	9	35	267	14	48
Future Volume (vph)	12	345	0	16	445	87	8	9	35	267	14	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3539		1755	3443			3125			1777	1524
Flt Permitted	0.30	1.00		0.49	1.00			0.92			0.69	1.00
Satd. Flow (perm)	557	3539		909	3443			2887			1290	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	375	0	17	484	95	9	10	38	290	15	52
RTOR Reduction (vph)	0	0	0	0	34	0	0	16	0	0	0	21
Lane Group Flow (vph)	13	375	0	17	545	0	0	41	0	0	305	31
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	15.0	15.0		15.0	15.0			35.5			35.5	35.5
Effective Green, g (s)	15.0	15.0		15.0	15.0			35.5			35.5	35.5
Actuated g/C Ratio	0.25	0.25		0.25	0.25			0.59			0.59	0.59
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	139	884		227	860			1708			763	901
v/s Ratio Prot		0.11			c0.16							
v/s Ratio Perm	0.02			0.02				0.01			c0.24	0.02
v/c Ratio	0.09	0.42		0.07	0.63			0.02			0.40	0.03
Uniform Delay, d1	17.3	18.9		17.2	20.1			5.1			6.6	5.1
Progression Factor	0.82	0.84		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.3	0.3		0.1	1.5			0.0			1.6	0.1
Delay (s)	14.5	16.2		17.3	21.6			5.1			8.1	5.2
Level of Service	B	B		B	C			A			A	A
Approach Delay (s)		16.1			21.5			5.1			7.7	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	12	16	27	8	100	2	330	54	84	445	16
Future Volume (vph)	23	12	16	27	8	100	2	330	54	84	445	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	10	11	16
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1737			1792	1794	1770	3912		1652	3404	
Flt Permitted		0.84			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1484			1822	1794	1770	3912		1652	3404	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	13	17	29	9	109	2	359	59	91	484	17
RTOR Reduction (vph)	0	15	0	0	0	98	0	19	0	0	3	0
Lane Group Flow (vph)	0	40	0	0	38	11	2	399	0	91	498	0
Confl. Peds. (#/hr)			4	4					3			
Confl. Bikes (#/hr)			1						2			
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		3.6			3.6	3.6	0.6	15.9		4.0	19.3	
Effective Green, g (s)		3.6			3.6	3.6	0.6	15.9		4.0	19.3	
Actuated g/C Ratio		0.10			0.10	0.10	0.02	0.43		0.11	0.52	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		143			176	173	28	1672		177	1766	
v/s Ratio Prot							0.00	0.10		c0.06	c0.15	
v/s Ratio Perm		c0.03			0.02	0.01						
v/c Ratio		0.28			0.22	0.06	0.07	0.24		0.51	0.28	
Uniform Delay, d1		15.6			15.5	15.3	18.0	6.8		15.7	5.0	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.2	0.1	1.1	0.1		2.5	0.1	
Delay (s)		16.0			15.7	15.3	19.1	6.9		18.2	5.1	
Level of Service		B			B	B	B	A		B	A	
Approach Delay (s)		16.0			15.4			6.9			7.1	
Approach LOS		B			B			A			A	

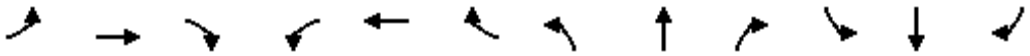
Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	37.2	Sum of lost time (s)	13.7
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	130	22	34	112	0	19	0	28	0	0	0
Future Volume (Veh/h)	0	130	22	34	112	0	19	0	28	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	141	24	37	122	0	21	0	30	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	122			165			349	349	153	379	361	122
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	122			165			349	349	153	379	361	122
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			96	100	97	100	100	100
cM capacity (veh/h)	1465			1413			594	560	893	548	551	929

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	165	159	51	0
Volume Left	0	37	21	0
Volume Right	24	0	30	0
cSH	1465	1413	739	1700
Volume to Capacity	0.00	0.03	0.07	0.00
Queue Length 95th (ft)	0	2	6	0
Control Delay (s)	0.0	1.9	10.2	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	1.9	10.2	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	29.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	63	10	2	45	1	17	0	7	1	0	1
Future Volume (Veh/h)	1	63	10	2	45	1	17	0	7	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	68	11	2	49	1	18	0	8	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	50			79			130	130	74	137	134	50
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	50			79			130	130	74	137	134	50
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	100	99	100	100	100
cM capacity (veh/h)	1557			1519			841	760	988	826	755	1019

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	80	52	26	2
Volume Left	1	2	18	1
Volume Right	11	1	8	1
cSH	1557	1519	881	912
Volume to Capacity	0.00	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	2	0
Control Delay (s)	0.1	0.3	9.2	9.0
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.3	9.2	9.0
Approach LOS			A	A

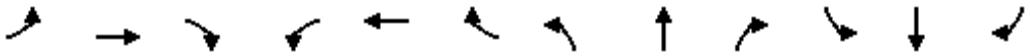
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	14.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	36	87	14	36	108	14
Future Volume (vph)	36	87	14	36	108	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	95	15	39	117	15

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	134	54	132
Volume Left (vph)	39	0	117
Volume Right (vph)	95	39	0
Hadj (s)	-0.33	-0.40	0.21
Departure Headway (s)	4.0	3.9	4.4
Degree Utilization, x	0.15	0.06	0.16
Capacity (veh/h)	864	870	783
Control Delay (s)	7.7	7.2	8.3
Approach Delay (s)	7.7	7.2	8.3
Approach LOS	A	A	A

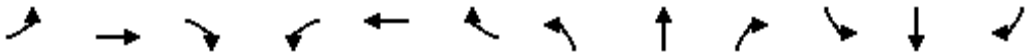
Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	101	76	12	67	3	57	8	12	12	9	4
Future Volume (Veh/h)	3	101	76	12	67	3	57	8	12	12	9	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	110	83	13	73	3	62	9	13	13	10	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	76			193			267	260	152	276	300	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	76			193			267	260	152	276	300	74
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			91	99	99	98	98	100
cM capacity (veh/h)	1523			1380			668	638	895	654	606	987

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	196	89	84	27
Volume Left	3	13	62	13
Volume Right	83	3	13	4
cSH	1523	1380	692	668
Volume to Capacity	0.00	0.01	0.12	0.04
Queue Length 95th (ft)	0	1	10	3
Control Delay (s)	0.1	1.2	10.9	10.6
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	1.2	10.9	10.6
Approach LOS			B	B

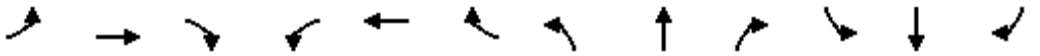
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	24.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	127	4	3	79	2	1	1	8	1	1	1
Future Volume (Veh/h)	0	127	4	3	79	2	1	1	8	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	138	4	3	86	2	1	1	9	1	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	88			142			234	234	140	242	235	87
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88			142			234	234	140	242	235	87
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	100	100	100
cM capacity (veh/h)	1508			1441			717	665	908	702	664	971

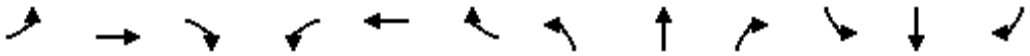
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	142	91	11	3
Volume Left	0	3	1	1
Volume Right	4	2	9	1
cSH	1508	1441	859	758
Volume to Capacity	0.00	0.00	0.01	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.0	0.3	9.2	9.8
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.3	9.2	9.8
Approach LOS			A	A

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	16.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	78	52	59	36	18	65	278	34	42	305	13
Future Volume (vph)	58	78	52	59	36	18	65	278	34	42	305	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.96			0.98		1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1766			1776		1770	3481		1770	3518	
Flt Permitted		0.86			0.77		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1550			1401		1770	3481		1770	3518	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	63	85	57	64	39	20	71	302	37	46	332	14
RTOR Reduction (vph)	0	22	0	0	10	0	0	14	0	0	4	0
Lane Group Flow (vph)	0	183	0	0	113	0	71	325	0	46	342	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		8.6			8.2		4.4	18.3		1.9	15.6	
Effective Green, g (s)		8.6			8.2		4.4	18.3		1.9	15.6	
Actuated g/C Ratio		0.20			0.19		0.10	0.43		0.04	0.37	
Clearance Time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		314			270		183	1502		79	1294	
v/s Ratio Prot							c0.04	0.09		c0.03	c0.10	
v/s Ratio Perm		c0.12			0.08							
v/c Ratio		0.58			0.42		0.39	0.22		0.58	0.26	
Uniform Delay, d1		15.3			15.0		17.7	7.6		19.9	9.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.8			1.2		0.5	0.1		10.5	0.1	
Delay (s)		18.0			16.2		18.2	7.6		30.3	9.5	
Level of Service		B			B		B	A		C	A	
Approach Delay (s)		18.0			16.2			9.5			11.9	
Approach LOS		B			B			A			B	

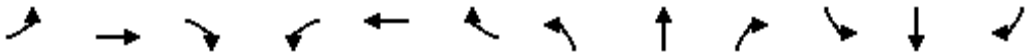
Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	42.4	Sum of lost time (s)	14.2
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	87	22	26	50	12	9	23	22	9	19	17
Future Volume (Veh/h)	15	87	22	26	50	12	9	23	22	9	19	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	95	24	28	54	13	10	25	24	10	21	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	67			119			284	262	107	292	268	60
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	67			119			284	262	107	292	268	60
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			98	96	97	98	97	98
cM capacity (veh/h)	1535			1469			625	624	947	610	620	1005

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	135	95	59	49
Volume Left	16	28	10	10
Volume Right	24	13	24	18
cSH	1535	1469	725	719
Volume to Capacity	0.01	0.02	0.08	0.07
Queue Length 95th (ft)	1	1	7	5
Control Delay (s)	0.9	2.3	10.4	10.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.9	2.3	10.4	10.4
Approach LOS			B	B

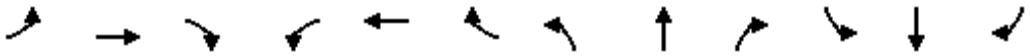
Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	20.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	51	6	4	31	1	5	8	8	4	4	2
Future Volume (vph)	2	51	6	4	31	1	5	8	8	4	4	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	55	7	4	34	1	5	9	9	4	4	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	64	39	23	10
Volume Left (vph)	2	4	5	4
Volume Right (vph)	7	1	9	2
Hadj (s)	-0.03	0.04	-0.16	-0.01
Departure Headway (s)	4.0	4.1	4.0	4.1
Degree Utilization, x	0.07	0.04	0.03	0.01
Capacity (veh/h)	889	871	873	844
Control Delay (s)	7.3	7.3	7.1	7.2
Approach Delay (s)	7.3	7.3	7.1	7.2
Approach LOS	A	A	A	A

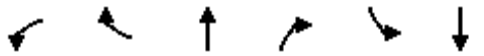
Intersection Summary				
Delay	7.2			
Level of Service	A			
Intersection Capacity Utilization	13.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	100	3	20	46	16	3	43	82	124	8	6
Future Volume (vph)	6	100	3	20	46	16	3	43	82	124	8	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	109	3	22	50	17	3	47	89	135	9	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	119	89	139	151
Volume Left (vph)	7	22	3	135
Volume Right (vph)	3	17	89	7
Hadj (s)	0.03	-0.03	-0.35	0.18
Departure Headway (s)	4.7	4.7	4.3	4.8
Degree Utilization, x	0.16	0.12	0.16	0.20
Capacity (veh/h)	707	707	796	714
Control Delay (s)	8.6	8.3	8.1	8.9
Approach Delay (s)	8.6	8.3	8.1	8.9
Approach LOS	A	A	A	A

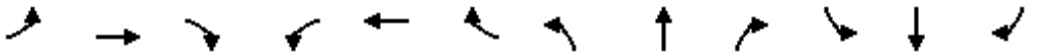
Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	36.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	45	27	11	50	54
Future Volume (vph)	0	45	27	11	50	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	49	29	12	54	59

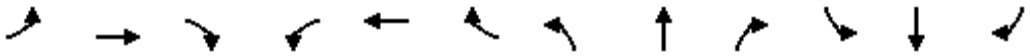
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	49	41	113
Volume Left (vph)	0	0	54
Volume Right (vph)	49	12	0
Hadj (s)	-0.57	-0.14	0.13
Departure Headway (s)	3.7	4.0	4.2
Degree Utilization, x	0.05	0.05	0.13
Capacity (veh/h)	938	881	850
Control Delay (s)	6.9	7.2	7.8
Approach Delay (s)	6.9	7.2	7.8
Approach LOS	A	A	A

Intersection Summary			
Delay	7.4		
Level of Service	A		
Intersection Capacity Utilization	15.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	116	38	231	47	195	28	198	110	166	279	6
Future Volume (vph)	15	116	38	231	47	195	28	198	110	166	279	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.95		1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1555		1788	1794	1770	3741		2006	3998	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1555		1788	1794	1770	3741		2006	3998	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	126	41	251	51	212	30	215	120	180	303	7
RTOR Reduction (vph)	0	0	37	0	0	131	0	59	0	0	1	0
Lane Group Flow (vph)	16	126	4	0	302	81	30	276	0	180	309	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	9.8	9.8	9.8		22.1	38.7	3.2	33.7		16.6	47.1	
Effective Green, g (s)	9.8	9.8	9.8		22.1	38.7	3.2	33.7		16.6	47.1	
Actuated g/C Ratio	0.10	0.10	0.10		0.22	0.38	0.03	0.33		0.16	0.46	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	194	180	150		390	685	55	1244		328	1858	
v/s Ratio Prot	0.01	c0.07			c0.17	0.05	0.02	c0.07		c0.09	0.08	
v/s Ratio Perm			0.00									
v/c Ratio	0.08	0.70	0.03		0.77	0.12	0.55	0.22		0.55	0.17	
Uniform Delay, d1	41.7	44.3	41.4		37.3	20.3	48.3	24.4		38.9	15.7	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	9.2	0.0		9.3	0.1	5.8	0.4		1.9	0.2	
Delay (s)	41.7	53.5	41.5		46.5	20.3	54.1	24.8		40.8	15.9	
Level of Service	D	D	D		D	C	D	C		D	B	
Approach Delay (s)		49.8			35.7			27.2			25.0	
Approach LOS		D			D			C			C	

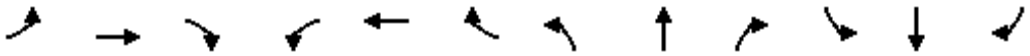
Intersection Summary			
HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	101.3	Sum of lost time (s)	19.1
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	389	5	16	579	33	0	0	26	18	0	20
Future Volume (Veh/h)	5	389	5	16	579	33	0	0	26	18	0	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	423	5	17	629	36	0	0	28	20	0	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	665			428			1138	1134	426	1144	1119	647
vC1, stage 1 conf vol							436	436		681	681	
vC2, stage 2 conf vol							703	699		464	438	
vCu, unblocked vol	665			358			1115	1111	355	1121	1094	647
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			100	100	96	94	100	95
cM capacity (veh/h)	924			1127			353	376	646	363	381	471

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	433	682	28	42
Volume Left	5	17	0	20
Volume Right	5	36	28	22
cSH	924	1127	646	413
Volume to Capacity	0.01	0.02	0.04	0.10
Queue Length 95th (ft)	0	1	3	8
Control Delay (s)	0.2	0.4	10.8	14.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.4	10.8	14.7
Approach LOS			B	B

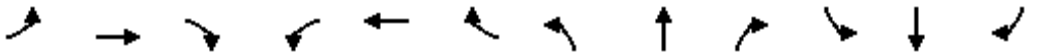
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	481	10	31	758	18	10	4	66	22	4	11
Future Volume (Veh/h)	7	481	10	31	758	18	10	4	66	22	4	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	523	11	34	824	20	11	4	72	24	4	12
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	844			535			1452	1458	530	1515	1453	835
vC1, stage 1 conf vol							546	546		902	902	
vC2, stage 2 conf vol							907	912		613	551	
vCu, unblocked vol	844			494			1450	1456	488	1516	1451	835
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			96	99	87	90	99	97
cM capacity (veh/h)	792			1025			264	292	556	251	293	367

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	8	534	34	844	87	40
Volume Left	8	0	34	0	11	24
Volume Right	0	11	0	20	72	12
cSH	792	1700	1025	1700	470	281
Volume to Capacity	0.01	0.31	0.03	0.50	0.18	0.14
Queue Length 95th (ft)	1	0	3	0	17	12
Control Delay (s)	9.6	0.0	8.6	0.0	14.4	19.9
Lane LOS	A		A		B	C
Approach Delay (s)	0.1		0.3		14.4	19.9
Approach LOS					B	C

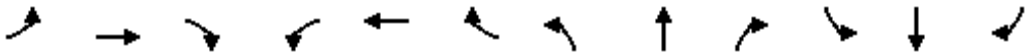
Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	54.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	650	0	0	838	106	0	0	0	0	0	18
Future Volume (Veh/h)	22	650	0	0	838	106	0	0	0	0	0	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	707	0	0	911	115	0	0	0	0	0	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1026			707			1686	1781	707	1724	1724	968
vC1, stage 1 conf vol							755	755		968	968	
vC2, stage 2 conf vol							931	1026		755	755	
vCu, unblocked vol	1026			707			1686	1781	707	1724	1724	968
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	100	100	94
cM capacity (veh/h)	677			891			227	240	435	242	263	308

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	24	707	0	1026	0	20
Volume Left	24	0	0	0	0	0
Volume Right	0	0	0	115	0	20
cSH	677	1700	1700	1700	1700	308
Volume to Capacity	0.04	0.42	0.00	0.60	0.00	0.06
Queue Length 95th (ft)	3	0	0	0	0	5
Control Delay (s)	10.5	0.0	0.0	0.0	0.0	17.5
Lane LOS	B				A	C
Approach Delay (s)	0.3		0.0		0.0	17.5
Approach LOS					A	C

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	60.5%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	67	0	0	58	28	270	23	41	612	10
Future Volume (Veh/h)	0	0	67	0	0	58	28	270	23	41	612	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	73	0	0	63	30	293	25	45	665	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1030	1138	670	1194	1132	159	676			318		
vC1, stage 1 conf vol	760	760		366	366							
vC2, stage 2 conf vol	270	378		828	766							
vCu, unblocked vol	1030	1138	670	1194	1132	159	676			318		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	82	100	100	93	97			96		
cM capacity (veh/h)	322	352	399	220	337	858	911			1239		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	73	63	30	195	123	45	676
Volume Left	0	0	30	0	0	45	0
Volume Right	73	63	0	0	25	0	11
cSH	399	858	911	1700	1700	1239	1700
Volume to Capacity	0.18	0.07	0.03	0.11	0.07	0.04	0.40
Queue Length 95th (ft)	17	6	3	0	0	3	0
Control Delay (s)	16.0	9.5	9.1	0.0	0.0	8.0	0.0
Lane LOS	C	A	A			A	
Approach Delay (s)	16.0	9.5	0.8			0.5	
Approach LOS	C	A					

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	43.6%	ICU Level of Service		A
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	84	15	36	0	48	15	8	0	22	243	6	0	6	238	26
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	93	17	40	0	53	17	9	0	24	269	7	0	7	264	29
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		150			79			300			300	
Entry Volume veh/h		147			77			294			294	
Circulating Flow (Vc), pc/h	324			386			117			94		
Exiting Flow (Vex), pc/h	31			70			371			357		
Capacity (cPCE), pc/h		817			768			1005			1029	
Capacity (c), veh/h		801			753			986			1008	
v/c Ratio (X)		0.18			0.10			0.30			0.29	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.4			5.8			6.7			6.5	
Lane LOS		A			A			A			A	
95% Queue		0.7			0.3			1.3			1.2	
Approach Delay, s/veh	6.4			5.8			6.7			6.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.5						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - West
E/W Street Name	West Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	17	10	14	0	18	10	21	0	14	120	18	0	21	120	16
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	19	11	16	0	20	11	23	0	16	133	20	0	23	133	18
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		46			54			169			174	
Entry Volume veh/h		45			53			166			171	
Circulating Flow (Vc), pc/h	176			168			53			47		
Exiting Flow (Vex), pc/h	54			45			175			169		
Capacity (cPCE), pc/h		948			955			1072			1078	
Capacity (c), veh/h		929			937			1051			1057	
v/c Ratio (X)		0.05			0.06			0.16			0.16	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.3			4.4			4.9			4.9	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.2			0.6			0.6	
Approach Delay, s/veh	4.3			4.4			4.9			4.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	4.7						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Kelly
E/W Street Name	Kelly Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	13	17	11	0	12	10	89	0	4	141	12	0	81	134	27
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	14	19	12	0	13	11	99	0	4	156	13	0	90	149	30
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		45			123			173			269	
Entry Volume veh/h		44			121			170			264	
Circulating Flow (Vc), pc/h	252			174			123			28		
Exiting Flow (Vex), pc/h	122			45			269			174		
Capacity (cPCE), pc/h		878			950			999			1099	
Capacity (c), veh/h		861			931			980			1077	
v/c Ratio (X)		0.05			0.13			0.17			0.24	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.7			5.1			5.3			5.6	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.4			0.6			1.0	
Approach Delay, s/veh	4.7			5.1			5.3			5.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	5.4						A					

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Future Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				168	0	0	8	72	0	24	801	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				1328	0	593	148	1692	527	148	1178	527
Arrive On Green				0.36	0.00	0.00	0.08	0.32	0.00	0.08	0.32	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				168	0	0	8	72	0	24	801	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Cycle Q Clear(g_c), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				1328	0	593	148	1692	527	148	1178	527
V/C Ratio(X)				0.13	0.00	0.00	0.05	0.04	0.00	0.16	0.68	0.00
Avail Cap(c_a), veh/h				1328	0	593	148	1692	527	148	1178	527
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				10.7	0.0	0.0	21.3	11.7	0.0	21.4	14.8	0.0
Incr Delay (d2), s/veh				0.2	0.0	0.0	0.7	0.0	0.0	2.4	3.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	0.0	0.1	0.2	0.0	0.4	5.3	0.0
LnGrp Delay(d),s/veh				10.9	0.0	0.0	21.9	11.8	0.0	23.8	18.0	0.0
LnGrp LOS				B			C	B		C	B	
Approach Vol, veh/h					168			80			825	
Approach Delay, s/veh					10.9			12.8			18.1	
Approach LOS					B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	20.0			8.0	20.0		22.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	16.0			4.0	16.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	2.5			2.2	11.5		3.5
Green Ext Time (p_c), s	0.0	0.2			0.0	2.2		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	16.6
HCM 2010 LOS	B

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	531	188	479	1082	0	0
Future Volume (veh/h)	531	188	479	1082	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	577	204	521	1176		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1840	823	1074	3313		
Arrive On Green	0.50	0.50	0.30	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	577	204	521	1176		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	3.7	2.8	4.8	1.9		
Cycle Q Clear(g_c), s	3.7	2.8	4.8	1.9		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1840	823	1074	3313		
V/C Ratio(X)	0.31	0.25	0.49	0.35		
Avail Cap(c_a), veh/h	1840	823	1074	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.9	5.7	11.5	0.3		
Incr Delay (d2), s/veh	0.4	0.7	1.6	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.0	1.4	2.5	1.0		
LnGrp Delay(d),s/veh	6.4	6.4	13.0	0.6		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	781			1697		
Approach Delay, s/veh	6.4			4.4		
Approach LOS	A			A		

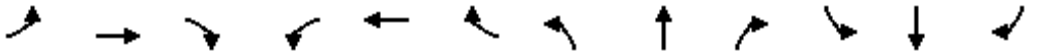
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			16.0	24.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			12.0	20.0				36.0
Max Q Clear Time (g_c+I1), s			6.8	5.7				3.9
Green Ext Time (p_c), s			1.0	4.0				10.8

Intersection Summary	
HCM 2010 Ctrl Delay	5.0
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	640	67	807	1970	67	1
Future Volume (veh/h)	640	67	807	1970	67	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	696	73	877	2141	73	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	982	439	954	2208	492	439
Arrive On Green	0.27	0.27	0.27	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	696	73	877	2141	73	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	10.3	2.0	14.3	33.4	1.8	0.0
Cycle Q Clear(g_c), s	10.3	2.0	14.3	33.4	1.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	982	439	954	2208	492	439
V/C Ratio(X)	0.71	0.17	0.92	0.97	0.15	0.00
Avail Cap(c_a), veh/h	982	439	954	2208	492	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.9	16.9	21.4	11.5	16.8	0.0
Incr Delay (d2), s/veh	4.3	0.8	15.1	13.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	1.0	8.9	20.4	1.0	0.0
LnGrp Delay(d),s/veh	24.2	17.7	36.5	24.7	17.4	0.0
LnGrp LOS	C	B	D	C	B	
Approach Vol, veh/h	769			3018	73	
Approach Delay, s/veh	23.6			28.1	17.4	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		3.8	16.3	12.3				35.4
Green Ext Time (p_c), s		0.1	0.0	1.7				0.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.0
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Future Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	312	3	100	542	0	11	0	121	24	34	35
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1149	11	284	1982	887	0	0	0	568	596	507
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3832	36	1845	3681	1647		0		1845	1937	1647
Grp Volume(v), veh/h	0	154	161	100	542	0		0.0		24	34	35
Grp Sat Flow(s),veh/h/ln	0	1840	1931	1845	1840	1647				1845	1937	1647
Q Serve(g_s), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Cycle Q Clear(g_c), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	566	594	284	1982	887				568	596	507
V/C Ratio(X)	0.00	0.27	0.27	0.35	0.27	0.00				0.04	0.06	0.07
Avail Cap(c_a), veh/h	0	566	594	284	1982	887				568	596	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.6	13.6	19.7	6.5	0.0				12.6	12.7	12.7
Incr Delay (d2), s/veh	0.0	1.2	1.1	3.4	0.3	0.0				0.1	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	1.9	1.5	2.1	0.0				0.3	0.4	0.4
LnGrp Delay(d),s/veh	0.0	14.8	14.7	23.1	6.8	0.0				12.8	12.9	13.0
LnGrp LOS		B	B	C	A					B	B	B
Approach Vol, veh/h		315			642						93	
Approach Delay, s/veh		14.7			9.4						12.9	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			4.5	5.3		2.8		6.1
Green Ext Time (p_c), s			0.1	1.3		0.2		3.7

Intersection Summary	
HCM 2010 Ctrl Delay	11.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Future Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	250	505	5	10	665	386	11	11	21	107	62	62
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	158	960	10	105	841	376	216	216	376	422	203	203
Arrive On Green	0.09	0.26	0.26	0.02	0.08	0.08	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3734	37	1845	3681	1647	945	945	1647	1845	890	890
Grp Volume(v), veh/h	250	249	261	10	665	386	22	0	21	107	0	124
Grp Sat Flow(s),veh/h/ln	1845	1840	1931	1845	1840	1647	1890	0	1647	1845	0	1780
Q Serve(g_s), s	6.0	8.1	8.1	0.4	12.4	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Cycle Q Clear(g_c), s	6.0	8.1	8.1	0.4	12.4	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Prop In Lane	1.00		0.02	1.00		1.00	0.50		1.00	1.00		0.50
Lane Grp Cap(c), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
V/C Ratio(X)	1.58	0.53	0.53	0.09	0.79	1.03	0.05	0.00	0.06	0.25	0.00	0.30
Avail Cap(c_a), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.0	22.3	22.3	32.6	30.7	32.4	21.1	0.0	21.1	22.1	0.0	22.4
Incr Delay (d2), s/veh	289.4	4.1	4.0	1.8	7.5	53.1	0.2	0.0	0.3	1.4	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.7	4.6	4.8	0.2	7.2	12.8	0.4	0.0	0.3	1.9	0.0	2.2
LnGrp Delay(d),s/veh	321.4	26.5	26.3	34.3	38.2	85.4	21.3	0.0	21.4	23.6	0.0	24.3
LnGrp LOS	F	C	C	C	D	F	C		C	C		C
Approach Vol, veh/h		760			1061			43			231	
Approach Delay, s/veh		123.4			55.3			21.3			24.0	
Approach LOS		F			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	10.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.7	2.4	10.1		6.0	8.0	18.0
Green Ext Time (p_c), s		0.1	0.0	1.9		0.7	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	75.9
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	492	362	132	894	400	422	443	376	422	443	376
Arrive On Green	0.02	0.08	0.08	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	2026	1489	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	388	355	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1674	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.1	14.6	14.7	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.1	14.6	14.7	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		0.89	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.87	0.87	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	31.1	31.1	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	19.8	22.1	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	9.9	9.3	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	53.4	50.8	53.2	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	D	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		52.1			43.4			27.3			30.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	16.7		11.8	5.1	17.8
Green Ext Time (p_c), s		1.3	0.0	0.2		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	40.0
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Future Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	93	8	17	71	42	2	5	7	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.8	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	15%	21%	13%
Vol Thru, %	38%	73%	54%
Vol Right, %	46%	6%	33%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	13	118	120
LT Vol	2	25	16
Through Vol	5	86	65
RT Vol	6	7	39
Lane Flow Rate	14	128	130
Geometry Grp	1	1	1
Degree of Util (X)	0.017	0.145	0.141
Departure Headway (Hd)	4.232	4.064	3.887
Convergence, Y/N	Yes	Yes	Yes
Cap	851	881	920
Service Time	2.232	2.093	1.921
HCM Lane V/C Ratio	0.016	0.145	0.141
HCM Control Delay	7.3	7.8	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.5

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Future Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	161	75	54	64	0	0	0	0	18	0	60

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	161	0	0			333	333	64
Stage 1	-	-	-	-	-	-			172	172	-
Stage 2	-	-	-	-	-	-			161	161	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1418	-	0			662	587	1000
Stage 1	0	-	-	-	-	0			858	756	-
Stage 2	0	-	-	-	-	0			868	765	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1418	-	-			636	0	1000
Mov Cap-2 Maneuver	-	-	-	-	-	-			636	0	-
Stage 1	-	-	-	-	-	-			825	0	-
Stage 2	-	-	-	-	-	-			868	0	-

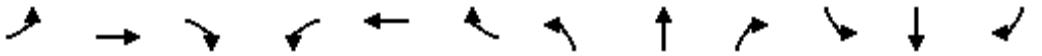
Approach	EB	WB	SB
HCM Control Delay, s	0	3.5	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1418	-	636	1000
HCM Lane V/C Ratio	-	-	0.038	-	0.029	0.06
HCM Control Delay (s)	-	-	7.6	0	10.8	8.8
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	518	201	1018	1229	17	967
Future Volume (veh/h)	518	201	1018	1229	17	967
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	563	0	1107	1336	18	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	883	395	1384	1317	394	618
Arrive On Green	0.24	0.00	0.39	0.68	0.21	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	563	0	1107	1336	18	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	10.3	0.0	20.6	51.0	0.6	0.0
Cycle Q Clear(g_c), s	10.3	0.0	20.6	51.0	0.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	883	395	1384	1317	394	618
V/C Ratio(X)	0.64	0.00	0.80	1.01	0.05	0.00
Avail Cap(c_a), veh/h	883	395	1384	1317	394	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.6	0.0	20.4	12.0	23.4	0.0
Incr Delay (d2), s/veh	3.5	0.0	4.9	28.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	11.1	36.7	0.3	0.0
LnGrp Delay(d),s/veh	29.1	0.0	25.4	40.4	23.7	0.0
LnGrp LOS	C		C	F	C	
Approach Vol, veh/h	563			2443	18	
Approach Delay, s/veh	29.1			33.6	23.7	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	33.0	22.0				55.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	29.0	18.0				51.0
Max Q Clear Time (g_c+I1), s		2.6	22.6	12.3				53.0
Green Ext Time (p_c), s		0.0	2.6	1.8				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	32.7
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	107	194	477	306	1676	214	38	179	121	74	78
Future Volume (vph)	273	107	194	477	306	1676	214	38	179	121	74	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3018	1441		1787	1583		1807	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3018	1441		1787	1583		1807	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	297	116	211	518	333	1822	233	41	195	132	80	85
RTOR Reduction (vph)	0	0	189	0	477	481	0	0	122	0	0	73
Lane Group Flow (vph)	297	116	22	518	767	430	0	274	73	0	212	12
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	17.0	9.6	9.6	34.2	28.4	28.4		16.3	16.3		13.1	13.1
Effective Green, g (s)	17.0	9.6	9.6	34.2	28.4	28.4		16.3	16.3		13.1	13.1
Actuated g/C Ratio	0.19	0.10	0.10	0.37	0.31	0.31		0.18	0.18		0.14	0.14
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	328	195	166	661	936	447		318	281		258	226
v/s Ratio Prot	c0.17	0.06		0.29	0.25			c0.15			c0.12	
v/s Ratio Perm			0.01			c0.30			0.05			0.01
v/c Ratio	0.91	0.59	0.13	0.78	0.97dr	0.96		0.86	0.26		0.82	0.05
Uniform Delay, d1	36.5	39.1	37.2	25.4	29.2	31.0		36.5	32.4		38.1	33.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	27.0	3.2	0.1	6.1	7.9	34.2		20.0	0.2		17.8	0.0
Delay (s)	63.5	42.3	37.3	31.4	37.1	65.2		56.5	32.6		55.9	33.9
Level of Service	E	D	D	C	D	E		E	C		E	C
Approach Delay (s)		50.7			45.6			46.5			49.6	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	46.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	91.5	Sum of lost time (s)	18.3
Intersection Capacity Utilization	109.1%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	669	0	323	0	0	437	681	0	557	561	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	0	0	742	0	351	0	0	484	755	0	618	622	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		0		0	742	351		484	755	618	622	
Entry Volume veh/h		0		0	727	351		475	740	606	610	
Circulating Flow (Vc), pc/h	1982			484			618			742		
Exiting Flow (Vex), pc/h	618			0			484			1364		
Capacity (cPCE), pc/h		156		786	805			733		648	672	
Capacity (c), veh/h		153		771	789			719		635	659	
v/c Ratio (X)		0.00		0.00	0.92			0.66		0.95	0.93	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.6		4.7	38.4	0.0		17.5	0.0	50.5	43.8	
Lane LOS		C		A	E	A		C	A	F	E	
95% Queue		0.0		0.0	13.1			5.0		13.4	12.4	
Approach Delay, s/veh				25.9			6.8			47.2		
Approach LOS				D			A			E		
Intersection Delay, s/veh / LOS	26.7						D					

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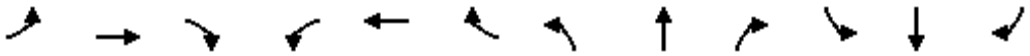
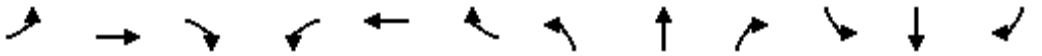


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	21	11	91	36	158	17	102	95	182	139	12
Future Volume (vph)	0	21	11	91	36	158	17	102	95	182	139	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	12	99	39	172	18	111	103	198	151	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	35	310	232	362
Volume Left (vph)	0	99	18	198
Volume Right (vph)	12	172	103	13
Hadj (s)	-0.17	-0.24	-0.22	0.12
Departure Headway (s)	5.9	5.3	5.2	5.4
Degree Utilization, x	0.06	0.46	0.34	0.54
Capacity (veh/h)	496	629	630	640
Control Delay (s)	9.3	12.7	10.9	14.4
Approach Delay (s)	9.3	12.7	10.9	14.4
Approach LOS	A	B	B	B

Intersection Summary				
Delay	12.8			
Level of Service	B			
Intersection Capacity Utilization	63.5%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	251	80	104	17	70	42	73	731	26	67	739	181
Future Volume (vph)	251	80	104	17	70	42	73	731	26	67	739	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1795	1583		1769		1770	1853		1770	1863	1583
Flt Permitted		0.70	1.00		0.95		0.14	1.00		0.13	1.00	1.00
Satd. Flow (perm)		1304	1583		1685		256	1853		249	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	273	87	113	18	76	46	79	795	28	73	803	197
RTOR Reduction (vph)	0	0	72	0	29	0	0	2	0	0	0	91
Lane Group Flow (vph)	0	360	41	0	111	0	79	821	0	73	803	106
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		21.7	21.7		21.7		31.1	31.1		32.3	32.3	32.3
Effective Green, g (s)		21.7	21.7		21.7		31.1	31.1		32.3	32.3	32.3
Actuated g/C Ratio		0.36	0.36		0.36		0.52	0.52		0.54	0.54	0.54
Clearance Time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		7.0	7.0	7.0
Lane Grp Cap (vph)		471	572		609		132	960		134	1002	852
v/s Ratio Prot								c0.44			0.43	
v/s Ratio Perm		c0.28	0.03		0.07		0.31			0.29		0.07
v/c Ratio		0.76	0.07		0.18		0.60	0.86		0.54	0.80	0.12
Uniform Delay, d1		16.9	12.5		13.1		10.1	12.5		9.0	11.2	6.9
Progression Factor		1.00	1.00		1.00		1.03	0.95		1.00	1.00	1.00
Incremental Delay, d2		10.0	0.2		0.5		16.4	8.6		15.0	6.7	0.3
Delay (s)		26.9	12.7		13.6		26.7	20.4		24.0	18.0	7.2
Level of Service		C	B		B		C	C		C	B	A
Approach Delay (s)		23.5			13.6			21.0			16.4	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	37	40	34	0	37	47	79	0	28	732	68	0	44	764	31
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	41	44	38	0	41	52	88	0	31	812	75	0	49	847	34
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		123			181			918			930	
Entry Volume veh/h		121			177			900			912	
Circulating Flow (Vc), pc/h	937			884			134			124		
Exiting Flow (Vex), pc/h	168			117			941			926		
Capacity (cPCE), pc/h		443			467			988			998	
Capacity (c), veh/h		434			458			969			979	
v/c Ratio (X)		0.28			0.39			0.93			0.93	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.8			14.7			34.9			35.1	
Lane LOS		B			B			D			E	
95% Queue		1.1			1.8			14.6			14.8	
Approach Delay, s/veh	12.8			14.7			34.9			35.1		
Approach LOS	B			B			D			E		
Intersection Delay, s/veh / LOS	32.0						D					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/12/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	48	38	53	0	23	38	64	0	40	717	53	0	29	717	90
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	53	42	59	0	26	42	71	0	44	795	59	0	32	795	100
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		154			139			898			927	
Entry Volume veh/h		151			136			880			909	
Circulating Flow (Vc), pc/h	853			892			127			112		
Exiting Flow (Vex), pc/h	133			186			919			880		
Capacity (cPCE), pc/h		482			463			995			1010	
Capacity (c), veh/h		472			454			976			990	
v/c Ratio (X)		0.32			0.30			0.90			0.92	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.8			12.8			30.7			32.6	
Lane LOS		B			B			D			D	
95% Queue		1.4			1.2			13.2			14.1	
Approach Delay, s/veh	12.8			12.8			30.7			32.6		
Approach LOS	B			B			D			D		
Intersection Delay, s/veh / LOS	29.1						D					

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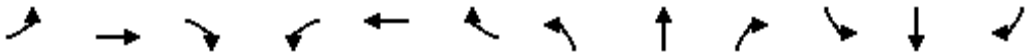


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	8	114	55	8	13	39	393	26	13	354	12
Future Volume (vph)	14	8	114	55	8	13	39	393	26	13	354	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	9	124	60	9	14	42	427	28	14	385	13

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	24	124	83	256	242	207	206
Volume Left (vph)	15	0	60	42	0	14	0
Volume Right (vph)	0	124	14	0	28	0	13
Hadj (s)	0.35	-0.67	0.08	0.12	-0.05	0.07	-0.01
Departure Headway (s)	7.2	6.2	6.9	5.9	5.7	6.0	5.9
Degree Utilization, x	0.05	0.21	0.16	0.42	0.39	0.34	0.34
Capacity (veh/h)	459	533	477	591	607	581	589
Control Delay (s)	9.3	9.6	11.2	11.9	11.1	10.8	10.6
Approach Delay (s)	9.6		11.2	11.5		10.7	
Approach LOS	A		B	B		B	

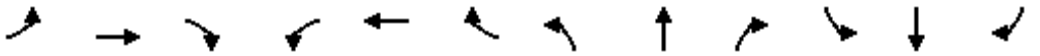
Intersection Summary				
Delay	11.0			
Level of Service	B			
Intersection Capacity Utilization	44.3%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	293	100	180	204	73	211
Future Volume (vph)	293	100	180	204	73	211
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	318	109	196	222	79	229

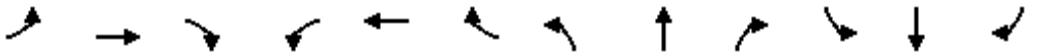
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	318	109	418	308
Volume Left (vph)	318	0	0	79
Volume Right (vph)	0	109	222	0
Hadj (s)	0.53	-0.67	-0.28	0.09
Departure Headway (s)	7.0	5.8	5.5	6.0
Degree Utilization, x	0.62	0.18	0.64	0.52
Capacity (veh/h)	482	588	626	569
Control Delay (s)	19.8	8.9	17.8	15.3
Approach Delay (s)	17.0		17.8	15.3
Approach LOS	C		C	C

Intersection Summary			
Delay	16.8		
Level of Service	C		
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	0	346	90	311	90	0	0	0	0	135	96
Future Volume (vph)	46	0	346	90	311	90	0	0	0	0	135	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.94	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3420						3319	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3420						3319	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	0	376	98	338	98	0	0	0	0	147	104
RTOR Reduction (vph)	0	0	309	71	48	0	0	0	0	0	84	0
Lane Group Flow (vph)	50	0	67	27	388	0	0	0	0	0	167	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	6.8		6.8	10.5	10.5						7.3	
Effective Green, g (s)	6.8		6.8	10.5	10.5						7.3	
Actuated g/C Ratio	0.18		0.18	0.28	0.28						0.19	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	315		497	487	942						635	
v/s Ratio Prot	c0.03		0.02	0.02	c0.11						c0.05	
v/s Ratio Perm												
v/c Ratio	0.16		0.14	0.06	0.41						0.26	
Uniform Delay, d1	13.2		13.2	10.2	11.3						13.1	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.2		0.1	0.0	0.3						0.2	
Delay (s)	13.5		13.3	10.2	11.6						13.3	
Level of Service	B		B	B	B						B	
Approach Delay (s)		13.3			11.3			0.0			13.3	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	38.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	210	436	77	278	745	0	0	625	197
Future Volume (vph)	0	0	0	210	436	77	278	745	0	0	625	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.96
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1515	1770	1863			1760	1451
Flt Permitted				0.95	1.00	1.00	0.12	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1515	231	1863			1760	1451
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	228	474	84	302	810	0	0	679	214
RTOR Reduction (vph)	0	0	0	0	0	66	0	0	0	0	1	48
Lane Group Flow (vph)	0	0	0	228	474	18	302	810	0	0	699	145
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.1	18.1	18.1	57.4	57.4			37.1	37.1
Effective Green, g (s)				18.1	18.1	18.1	57.4	57.4			37.1	37.1
Actuated g/C Ratio				0.21	0.21	0.21	0.67	0.67			0.43	0.43
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				374	749	320	430	1250			763	629
v/s Ratio Prot				0.13	c0.13		0.13	c0.43			c0.40	
v/s Ratio Perm						0.01	0.35					0.10
v/c Ratio				0.61	0.63	0.06	0.70	0.65			0.92	0.23
Uniform Delay, d1				30.5	30.7	26.9	25.1	8.2			22.7	15.2
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				7.2	4.0	0.3	5.5	1.3			15.8	0.3
Delay (s)				37.7	34.7	27.2	30.6	9.5			38.6	15.5
Level of Service				D	C	C	C	A			D	B
Approach Delay (s)		0.0			34.8			15.2			33.6	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	85.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	151	0	134	744	292	16	82	322	406	54	22
Future Volume (vph)	19	151	0	134	744	292	16	82	322	406	54	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	4.0		4.6	4.0	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539		1770	3539	1583		1848	1583	1681	1688	
Flt Permitted	0.29	1.00		0.65	1.00	1.00		0.93	1.00	0.69	0.73	
Satd. Flow (perm)	533	3539		1207	3539	1583		1739	1583	1219	1272	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	164	0	146	809	317	17	89	350	441	59	24
RTOR Reduction (vph)	0	0	0	0	0	317	0	0	350	0	7	0
Lane Group Flow (vph)	21	164	0	146	809	0	0	106	0	256	261	0
Turn Type	Perm	NA		Perm	NA	NA	Perm	NA	NA	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.2	17.2		16.8	16.8	0.0		16.2	0.0	16.2	16.2	
Effective Green, g (s)	17.2	17.2		16.8	16.8	0.0		16.2	0.0	16.2	16.2	
Actuated g/C Ratio	0.40	0.40		0.39	0.39	0.00		0.38	0.00	0.38	0.38	
Clearance Time (s)	4.6	4.6		5.0	5.0			4.6		4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5			4.0		4.0	4.0	
Lane Grp Cap (vph)	215	1428		476	1395	0		661	0	463	483	
v/s Ratio Prot		0.05			c0.23							
v/s Ratio Perm	0.04			0.12				0.06		c0.21	0.21	
v/c Ratio	0.10	0.11		0.31	0.58	0.00		0.16	0.00	0.55	0.54	
Uniform Delay, d1	7.9	7.9		8.9	10.1	21.3		8.7	21.3	10.4	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.0		0.4	0.6	0.0		0.2	0.0	1.8	1.6	
Delay (s)	8.2	8.0		9.3	10.8	21.3		8.9	21.3	12.1	11.8	
Level of Service	A	A		A	B	C		A	C	B	B	
Approach Delay (s)		8.0			13.2			18.4			12.0	
Approach LOS		A			B			B			B	

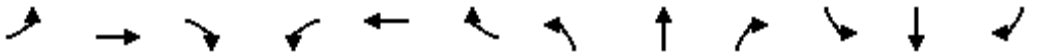
Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	42.6	Sum of lost time (s)	9.6
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	321	16	24	66	25	30
Future Volume (Veh/h)	321	16	24	66	25	30
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	349	17	26	72	27	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			366		482	358
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			366		482	358
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		95	95
cM capacity (veh/h)			1193		532	687

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	366	98	60
Volume Left	0	26	27
Volume Right	17	0	33
cSH	1700	1193	607
Volume to Capacity	0.22	0.02	0.10
Queue Length 95th (ft)	0	2	8
Control Delay (s)	0.0	2.3	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	2.3	11.6
Approach LOS			B

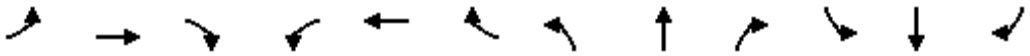
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	355	221	226	0	0	0	94	507	160	170	435	116
Future Volume (vph)	355	221	226	0	0	0	94	507	160	170	435	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.94				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1493				1770	1863	1552	1770	1863	1516
Flt Permitted	0.95	1.00	1.00				0.49	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1770	1863	1493				917	1863	1552	347	1863	1516
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	386	240	246	0	0	0	102	551	174	185	473	126
RTOR Reduction (vph)	0	0	166	0	0	0	0	0	91	0	0	59
Lane Group Flow (vph)	386	240	80	0	0	0	102	551	83	185	473	67
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	19.5	19.5	19.5				22.7	22.7	22.7	31.7	31.7	31.7
Effective Green, g (s)	19.5	19.5	19.5				22.7	22.7	22.7	31.7	31.7	31.7
Actuated g/C Ratio	0.32	0.32	0.32				0.38	0.38	0.38	0.53	0.53	0.53
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	575	605	485				346	704	587	301	984	800
v/s Ratio Prot	c0.22	0.13						c0.30		c0.05	0.25	
v/s Ratio Perm			0.05				0.11		0.05	0.27		0.04
v/c Ratio	0.67	0.40	0.16				0.29	0.78	0.14	0.61	0.48	0.08
Uniform Delay, d1	17.5	15.7	14.4				13.0	16.5	12.3	10.1	8.9	7.0
Progression Factor	1.00	1.00	1.00				1.07	1.07	1.64	1.00	1.00	1.00
Incremental Delay, d2	6.1	1.9	0.7				1.9	7.4	0.4	3.7	1.7	0.2
Delay (s)	23.6	17.6	15.2				15.9	25.1	20.5	13.8	10.6	7.2
Level of Service	C	B	B				B	C	C	B	B	A
Approach Delay (s)		19.6			0.0			23.0			10.8	
Approach LOS		B			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

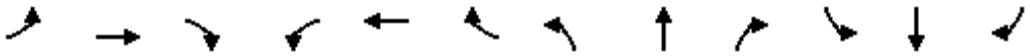
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	588	36	0	0	0	0	10	36	29	27	0
Future Volume (Veh/h)	16	588	36	0	0	0	0	10	36	29	27	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	639	39	0	0	0	0	11	39	32	29	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			678			707	692	339	398	712	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			678			707	692	339	398	712	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	93	92	100
cM capacity (veh/h)	1622			910			300	362	657	489	352	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	336	358	50	61
Volume Left	17	0	0	32
Volume Right	0	39	39	0
cSH	1622	1700	557	413
Volume to Capacity	0.01	0.21	0.09	0.15
Queue Length 95th (ft)	1	0	7	13
Control Delay (s)	0.5	0.0	12.1	15.2
Lane LOS	A		B	C
Approach Delay (s)	0.2		12.1	15.2
Approach LOS			B	C

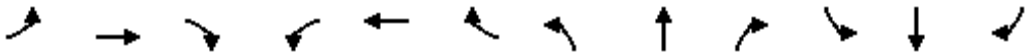
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	34.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Future Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	1388	28	0	0	0	0	14	36	64	52	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	736	722	50	116
Volume Left (vph)	42	0	0	64
Volume Right (vph)	0	28	36	0
Hadj (s)	0.06	0.01	-0.40	0.14
Departure Headway (s)	5.1	5.0	5.6	6.0
Degree Utilization, x	1.00	1.00	0.08	0.19
Capacity (veh/h)	736	722	628	586
Control Delay (s)	54.7	54.4	9.1	10.4
Approach Delay (s)	54.5		9.1	10.4
Approach LOS	F		A	B

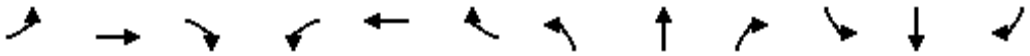
Intersection Summary				
Delay	50.0			
Level of Service	E			
Intersection Capacity Utilization	56.4%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	291	524	13	43	0	21	0	19	12	0	0	0
Future Volume (vph)	291	524	13	43	0	21	0	19	12	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	316	570	14	47	0	23	0	21	13	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	316	584	70	34
Volume Left (vph)	316	0	47	0
Volume Right (vph)	0	14	23	13
Hadj (s)	0.53	0.02	-0.03	-0.20
Departure Headway (s)	5.2	4.7	4.8	5.4
Degree Utilization, x	0.46	0.76	0.09	0.05
Capacity (veh/h)	689	758	732	622
Control Delay (s)	11.3	19.5	8.3	8.7
Approach Delay (s)	16.6		8.3	8.7
Approach LOS	C		A	A

Intersection Summary				
Delay	15.8			
Level of Service	C			
Intersection Capacity Utilization	45.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	39	0	0	51	17	549	74	37	503	18
Future Volume (Veh/h)	0	0	39	0	0	51	17	549	74	37	503	18
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	42	0	0	55	18	597	80	40	547	20
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked	0.85	0.85	0.84	0.85	0.85	0.98	0.84			0.98		
vC, conflicting volume	1332	1364	564	1349	1334	644	574			684		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1247	1284	390	1267	1249	625	402			666		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	88	98			96		
cM capacity (veh/h)	106	130	552	107	137	471	970			896		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	42	55	18	677	40	567
Volume Left	0	0	18	0	40	0
Volume Right	42	55	0	80	0	20
cSH	552	471	970	1700	896	1700
Volume to Capacity	0.08	0.12	0.02	0.40	0.04	0.33
Queue Length 95th (ft)	6	10	1	0	3	0
Control Delay (s)	12.1	13.7	8.8	0.0	9.2	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.1	13.7	0.2		0.6	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	43.5%	ICU Level of Service		A
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	0	71	0	64	14	12	0	46	540	19	0	24	490	61
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	16	0	79	0	71	16	13	0	51	599	21	0	27	543	68
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		95			100			671			638	
Entry Volume veh/h		93			98			658			625	
Circulating Flow (Vc), pc/h	641			666			43			138		
Exiting Flow (Vex), pc/h	48			135			628			693		
Capacity (cPCE), pc/h		595			581			1082			984	
Capacity (c), veh/h		584			569			1061			965	
v/c Ratio (X)		0.16			0.17			0.62			0.65	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.1			8.5			11.9			13.6	
Lane LOS		A			A			B			B	
95% Queue		0.6			0.6			4.5			4.9	
Approach Delay, s/veh	8.1			8.5			11.9			13.6		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	12.1						B					

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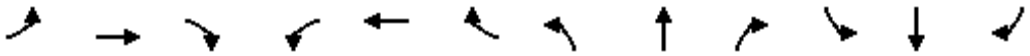
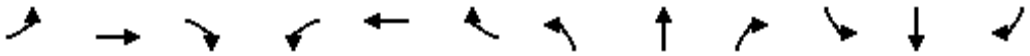


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	46	78	26	87	6	135	4	257	70	161	158	2
Future Volume (vph)	46	78	26	87	6	135	4	257	70	161	158	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	85	28	95	7	147	4	279	76	175	172	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	163	249	359	349
Volume Left (vph)	50	95	4	175
Volume Right (vph)	28	147	76	2
Hadj (s)	-0.01	-0.24	-0.09	0.13
Departure Headway (s)	6.6	6.2	5.9	6.1
Degree Utilization, x	0.30	0.43	0.59	0.59
Capacity (veh/h)	458	509	573	549
Control Delay (s)	12.5	13.7	16.8	17.5
Approach Delay (s)	12.5	13.7	16.8	17.5
Approach LOS	B	B	C	C

Intersection Summary				
Delay	15.7			
Level of Service	C			
Intersection Capacity Utilization	64.7%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	332	43	19	231	35	41	63	65	28	83	14
Future Volume (Veh/h)	12	332	43	19	231	35	41	63	65	28	83	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	361	47	21	251	38	45	68	71	30	90	15
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	303			415			790	762	392	842	767	285
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	303			415			790	762	392	842	767	285
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			80	79	89	85	72	98
cM capacity (veh/h)	1243			1137			226	319	653	202	317	745

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	421	310	184	135
Volume Left	13	21	45	30
Volume Right	47	38	71	15
cSH	1243	1137	353	299
Volume to Capacity	0.01	0.02	0.52	0.45
Queue Length 95th (ft)	1	1	72	56
Control Delay (s)	0.4	0.7	25.7	26.6
Lane LOS	A	A	D	D
Approach Delay (s)	0.4	0.7	25.7	26.6
Approach LOS			D	D

Intersection Summary				
Average Delay	8.3			
Intersection Capacity Utilization	43.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	99	130	175	0	126	105	22	0	153	529	138	0	24	529	49
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	110	144	194	0	140	116	24	0	170	586	153	0	27	586	54
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		448			280			909			667	
Entry Volume veh/h		439			275			891			654	
Circulating Flow (Vc), pc/h		753			866			281			426	
Exiting Flow (Vex), pc/h		324			340			720			920	
Capacity (cPCE), pc/h		532			475			853			738	
Capacity (c), veh/h		522			466			836			724	
v/c Ratio (X)		0.84			0.59			1.07			0.90	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		37.8			21.2			71.8			37.8	
Lane LOS		E			C			F			E	
95% Queue		8.7			3.7			22.0			11.9	
Approach Delay, s/veh	37.8			21.2			71.8			37.8		
Approach LOS	E			C			F			E		
Intersection Delay, s/veh / LOS	49.2						E					

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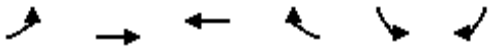
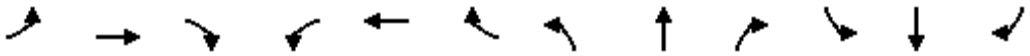


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	460	342	24	36	38
Future Volume (Veh/h)	9	460	342	24	36	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	500	372	26	39	41
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	406				914	394
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	406				914	394
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				87	94
cM capacity (veh/h)	1145				298	650

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	510	398	80
Volume Left	10	0	39
Volume Right	0	26	41
cSH	1145	1700	413
Volume to Capacity	0.01	0.23	0.19
Queue Length 95th (ft)	1	0	18
Control Delay (s)	0.3	0.0	15.8
Lane LOS	A		C
Approach Delay (s)	0.3	0.0	15.8
Approach LOS			C

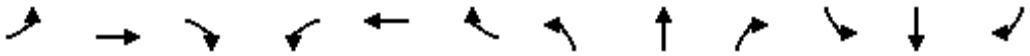
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	474	4	2	316	29	2	1	3	44	0	35
Future Volume (Veh/h)	26	474	4	2	316	29	2	1	3	44	0	35
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	515	4	2	343	32	2	1	3	48	0	38
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	377			519			976	954	517	942	940	363
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	377			519			976	954	517	942	940	363
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			99	100	99	80	100	94
cM capacity (veh/h)	1180			1047			213	252	558	236	256	680

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	547	377	6	86
Volume Left	28	2	2	48
Volume Right	4	32	3	38
cSH	1180	1047	320	331
Volume to Capacity	0.02	0.00	0.02	0.26
Queue Length 95th (ft)	2	0	1	25
Control Delay (s)	0.7	0.1	16.5	19.6
Lane LOS	A	A	C	C
Approach Delay (s)	0.7	0.1	16.5	19.6
Approach LOS			C	C

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	58.2%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	272	285	82	196	0	170	0	114	0	0	0
Future Volume (vph)	0	272	285	82	196	0	170	0	114	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	296	310	89	213	0	185	0	124	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	606	302	309	0
Volume Left (vph)	0	89	185	0
Volume Right (vph)	310	0	124	0
Hadj (s)	-0.27	0.09	-0.09	0.00
Departure Headway (s)	5.2	6.0	6.2	7.2
Degree Utilization, x	0.87	0.50	0.53	0.00
Capacity (veh/h)	606	569	551	900
Control Delay (s)	33.1	14.8	15.9	10.2
Approach Delay (s)	33.1	14.8	15.9	0.0
Approach LOS	D	B	C	A

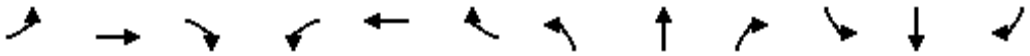
Intersection Summary				
Delay		24.2		
Level of Service		C		
Intersection Capacity Utilization		79.2%	ICU Level of Service	D
Analysis Period (min)		15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	64	131	185	94	94	180
Future Volume (vph)	64	131	185	94	94	180
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	70	142	201	102	102	196

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	212	303	298
Volume Left (vph)	70	0	102
Volume Right (vph)	142	102	0
Hadj (s)	-0.30	-0.17	0.10
Departure Headway (s)	5.0	4.7	4.9
Degree Utilization, x	0.30	0.39	0.41
Capacity (veh/h)	653	733	694
Control Delay (s)	10.1	10.7	11.3
Approach Delay (s)	10.1	10.7	11.3
Approach LOS	B	B	B

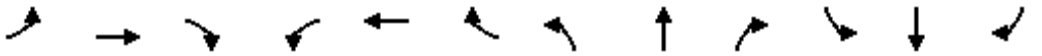
Intersection Summary			
Delay	10.8		
Level of Service	B		
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	375	22	20	310	69	30	42	40	75	26	21
Future Volume (Veh/h)	14	375	22	20	310	69	30	42	40	75	26	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	408	24	22	337	75	33	46	43	82	28	23
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.88						0.88	0.88		0.88	0.88	0.88
vC, conflicting volume	415			443			920	920	439	946	894	382
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	266			443			841	840	439	869	811	228
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			84	82	93	55	89	97
cM capacity (veh/h)	1138			1107			212	253	608	183	263	709

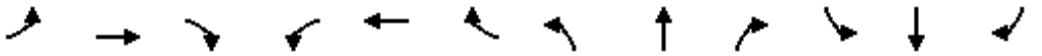
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	447	434	122	133
Volume Left	15	22	33	82
Volume Right	24	75	43	23
cSH	1138	1107	299	227
Volume to Capacity	0.01	0.02	0.41	0.59
Queue Length 95th (ft)	1	2	48	83
Control Delay (s)	0.4	0.6	25.1	41.1
Lane LOS	A	A	D	E
Approach Delay (s)	0.4	0.6	25.1	41.1
Approach LOS			D	E

Intersection Summary				
Average Delay	7.9			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			



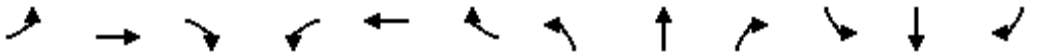
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	230	90	252	223	211	94	577	162	217	490	30
Future Volume (vph)	58	230	90	252	223	211	94	577	162	217	490	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	10	11	11	16	16	16
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844	1534	1681	1761	1794	1652	3295		2006	2093	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1844	1534	1681	1761	1794	1652	3295		2006	2093	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	63	250	98	274	242	229	102	627	176	236	533	33
RTOR Reduction (vph)	0	0	79	0	0	187	0	28	0	0	3	0
Lane Group Flow (vph)	0	313	19	247	269	42	102	775	0	236	563	0
Confl. Peds. (#/hr)			10	10					3			
Confl. Bikes (#/hr)			4						3			
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		17.4	17.4	16.4	16.4	16.4	6.8	25.6		11.8	30.6	
Effective Green, g (s)		17.4	17.4	16.4	16.4	16.4	6.8	25.6		11.8	30.6	
Actuated g/C Ratio		0.19	0.19	0.18	0.18	0.18	0.08	0.28		0.13	0.34	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		356	296	306	320	326	124	937		263	711	
v/s Ratio Prot		c0.17		0.15	c0.15		0.06	c0.24		0.12	c0.27	
v/s Ratio Perm			0.01			0.02						
v/c Ratio		0.88	0.06	0.81	0.84	0.13	0.82	0.83		0.90	0.79	
Uniform Delay, d1		35.3	29.6	35.3	35.5	30.8	41.0	30.1		38.5	26.8	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		20.5	0.0	14.7	18.1	0.2	32.4	8.3		29.9	8.8	
Delay (s)		55.8	29.7	50.0	53.6	31.0	73.4	38.4		68.4	35.7	
Level of Service		E	C	D	D	C	E	D		E	D	
Approach Delay (s)		49.5			45.5			42.4			45.3	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	45.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



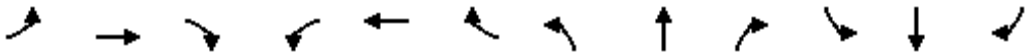
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	646	6	22	718	196	9	18	58	366	14	90
Future Volume (vph)	45	646	6	22	718	196	9	18	58	366	14	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3533		1761	3415			3131			1776	1524
Flt Permitted	0.19	1.00		0.28	1.00			0.92			0.66	1.00
Satd. Flow (perm)	350	3533		521	3415			2885			1235	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	702	7	24	780	213	10	20	63	398	15	98
RTOR Reduction (vph)	0	1	0	0	44	0	0	32	0	0	0	40
Lane Group Flow (vph)	49	708	0	24	949	0	0	61	0	0	413	58
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	21.3	21.3		21.3	21.3			29.2			29.2	29.2
Effective Green, g (s)	21.3	21.3		21.3	21.3			29.2			29.2	29.2
Actuated g/C Ratio	0.36	0.36		0.36	0.36			0.49			0.49	0.49
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	124	1254		184	1212			1404			601	741
v/s Ratio Prot		0.20			c0.28							
v/s Ratio Perm	0.14			0.05				0.02			c0.33	0.04
v/c Ratio	0.40	0.56		0.13	0.78			0.04			0.69	0.08
Uniform Delay, d1	14.5	15.6		13.1	17.3			8.1			11.9	8.2
Progression Factor	1.02	1.08		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.7	0.2		0.3	3.4			0.1			6.3	0.2
Delay (s)	15.4	17.0		13.4	20.7			8.1			18.2	8.4
Level of Service	B	B		B	C			A			B	A
Approach Delay (s)		16.9			20.5			8.1			16.3	
Approach LOS		B			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	15	15	50	15	167	20	737	91	213	768	18
Future Volume (vph)	40	15	15	50	15	167	20	737	91	213	768	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	10	11	16
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1752			1789	1794	1770	3933		1652	3409	
Flt Permitted		0.78			0.81	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1412			1504	1794	1770	3933		1652	3409	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	16	16	54	16	182	22	801	99	232	835	20
RTOR Reduction (vph)	0	12	0	0	0	158	0	11	0	0	1	0
Lane Group Flow (vph)	0	63	0	0	70	24	22	889	0	232	854	0
Confl. Peds. (#/hr)			4	4					3			
Confl. Bikes (#/hr)			1						2			
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		8.4			8.4	8.4	1.3	28.0		13.1	39.8	
Effective Green, g (s)		8.4			8.4	8.4	1.3	28.0		13.1	39.8	
Actuated g/C Ratio		0.13			0.13	0.13	0.02	0.44		0.21	0.63	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		187			199	238	36	1742		342	2146	
v/s Ratio Prot							0.01	c0.23		c0.14	0.25	
v/s Ratio Perm		0.04			c0.05	0.01						
v/c Ratio		0.34			0.35	0.10	0.61	0.51		0.68	0.40	
Uniform Delay, d1		24.9			24.9	24.1	30.7	12.7		23.1	5.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.4	0.1	27.0	0.3		5.3	0.1	
Delay (s)		25.3			25.3	24.2	57.7	12.9		28.4	5.9	
Level of Service		C			C	C	E	B		C	A	
Approach Delay (s)		25.3			24.5			14.0			10.7	
Approach LOS		C			C			B			B	

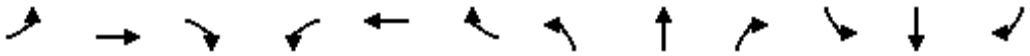
Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	63.2	Sum of lost time (s)	13.7
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	292	31	34	177	0	69	0	59	0	0	0
Future Volume (Veh/h)	0	292	31	34	177	0	69	0	59	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	317	34	37	192	0	75	0	64	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	192			351			600	600	334	664	617	192
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	192			351			600	600	334	664	617	192
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			81	100	91	100	100	100
cM capacity (veh/h)	1381			1208			403	402	708	332	393	850

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	351	229	139	0
Volume Left	0	37	75	0
Volume Right	34	0	64	0
cSH	1381	1208	503	1700
Volume to Capacity	0.00	0.03	0.28	0.00
Queue Length 95th (ft)	0	2	28	0
Control Delay (s)	0.0	1.5	14.9	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	1.5	14.9	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	45.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	169	38	0	65	0	38	1	12	0	0	0
Future Volume (Veh/h)	0	169	38	0	65	0	38	1	12	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	184	41	0	71	0	41	1	13	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	71			225			276	276	204	289	296	71
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	71			225			276	276	204	289	296	71
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			94	100	98	100	100	100
cM capacity (veh/h)	1529			1344			677	632	836	652	616	991

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	225	71	55	0
Volume Left	0	0	41	0
Volume Right	41	0	13	0
cSH	1529	1344	708	1700
Volume to Capacity	0.00	0.00	0.08	0.00
Queue Length 95th (ft)	0	0	6	0
Control Delay (s)	0.0	0.0	10.5	0.0
Lane LOS			B	A
Approach Delay (s)	0.0	0.0	10.5	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	21.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	82	248	26	47	296	26
Future Volume (vph)	82	248	26	47	296	26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	270	28	51	322	28

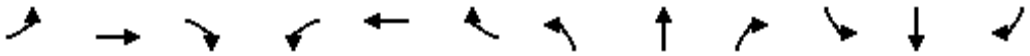
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	359	79	350
Volume Left (vph)	89	0	322
Volume Right (vph)	270	51	0
Hadj (s)	-0.37	-0.35	0.22
Departure Headway (s)	4.6	4.9	5.1
Degree Utilization, x	0.46	0.11	0.50
Capacity (veh/h)	731	659	668
Control Delay (s)	11.6	8.5	13.1
Approach Delay (s)	11.6	8.5	13.1
Approach LOS	B	A	B

Intersection Summary			
Delay	12.0		
Level of Service	B		
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	203	103	14	159	14	140	17	18	4	12	21
Future Volume (Veh/h)	9	203	103	14	159	14	140	17	18	4	12	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	221	112	15	173	15	152	18	20	4	13	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	188			333			537	515	277	536	564	180
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	188			333			537	515	277	536	564	180
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			64	96	97	99	97	97
cM capacity (veh/h)	1386			1226			426	455	762	423	427	862

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	343	203	190	40
Volume Left	10	15	152	4
Volume Right	112	15	20	23
cSH	1386	1226	449	601
Volume to Capacity	0.01	0.01	0.42	0.07
Queue Length 95th (ft)	1	1	52	5
Control Delay (s)	0.3	0.7	18.7	11.4
Lane LOS	A	A	C	B
Approach Delay (s)	0.3	0.7	18.7	11.4
Approach LOS			C	B

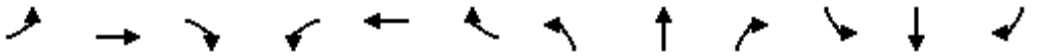
Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	42.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	227	3	9	189	4	2	2	8	2	1	1
Future Volume (Veh/h)	1	227	3	9	189	4	2	2	8	2	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	247	3	10	205	4	2	2	9	2	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	209			250			479	480	248	488	479	207
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	209			250			479	480	248	488	479	207
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	99	100	100	100
cM capacity (veh/h)	1362			1316			492	481	790	480	482	833

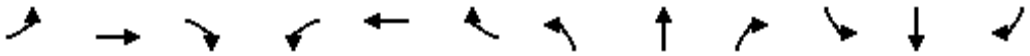
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	251	219	13	4
Volume Left	1	10	2	2
Volume Right	3	4	9	1
cSH	1362	1316	663	538
Volume to Capacity	0.00	0.01	0.02	0.01
Queue Length 95th (ft)	0	1	1	1
Control Delay (s)	0.0	0.4	10.5	11.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.0	0.4	10.5	11.7
Approach LOS			B	B

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	26.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	133	122	68	76	24	134	719	78	97	571	47
Future Volume (vph)	116	133	122	68	76	24	134	719	78	97	571	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.96			0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1753			1791		1770	3487		1770	3499	
Flt Permitted		0.83			0.65		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1476			1194		1770	3487		1770	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	145	133	74	83	26	146	782	85	105	621	51
RTOR Reduction (vph)	0	25	0	0	9	0	0	12	0	0	9	0
Lane Group Flow (vph)	0	379	0	0	174	0	146	855	0	105	663	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		19.0			18.6		17.9	28.0		8.1	18.0	
Effective Green, g (s)		19.0			18.6		17.9	28.0		8.1	18.0	
Actuated g/C Ratio		0.28			0.27		0.26	0.41		0.12	0.26	
Clearance Time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		408			323		461	1421		208	916	
v/s Ratio Prot							0.08	c0.25		0.06	c0.19	
v/s Ratio Perm		c0.26			0.15							
v/c Ratio		0.93			0.54		0.32	0.60		0.50	0.72	
Uniform Delay, d1		24.2			21.4		20.5	16.0		28.4	23.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		27.1			2.0		0.1	1.9		1.9	5.0	
Delay (s)		51.2			23.3		20.6	17.9		30.3	28.0	
Level of Service		D			C		C	B		C	C	
Approach Delay (s)		51.2			23.3			18.3			28.4	
Approach LOS		D			C			B			C	

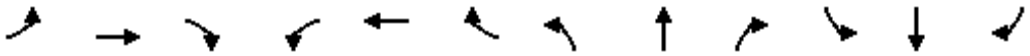
Intersection Summary			
HCM 2000 Control Delay	27.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	68.7	Sum of lost time (s)	14.2
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	167	58	56	75	12	67	69	26	19	27	22
Future Volume (Veh/h)	22	167	58	56	75	12	67	69	26	19	27	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	182	63	61	82	13	73	75	28	21	29	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	95			245			510	478	214	538	504	88
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	95			245			510	478	214	538	504	88
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			95			83	84	97	94	93	98
cM capacity (veh/h)	1499			1321			418	456	827	366	442	970

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	269	156	176	74
Volume Left	24	61	73	21
Volume Right	63	13	28	24
cSH	1499	1321	472	501
Volume to Capacity	0.02	0.05	0.37	0.15
Queue Length 95th (ft)	1	4	43	13
Control Delay (s)	0.8	3.3	17.1	13.4
Lane LOS	A	A	C	B
Approach Delay (s)	0.8	3.3	17.1	13.4
Approach LOS			C	B

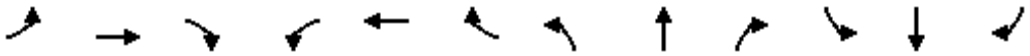
Intersection Summary				
Average Delay	7.0			
Intersection Capacity Utilization	42.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	85	11	13	40	2	14	24	13	3	11	5
Future Volume (vph)	7	85	11	13	40	2	14	24	13	3	11	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	92	12	14	43	2	15	26	14	3	12	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	112	59	55	20
Volume Left (vph)	8	14	15	3
Volume Right (vph)	12	2	14	5
Hadj (s)	-0.02	0.06	-0.06	-0.09
Departure Headway (s)	4.1	4.2	4.2	4.2
Degree Utilization, x	0.13	0.07	0.06	0.02
Capacity (veh/h)	854	827	809	808
Control Delay (s)	7.7	7.6	7.5	7.3
Approach Delay (s)	7.7	7.6	7.5	7.3
Approach LOS	A	A	A	A

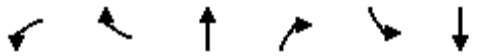
Intersection Summary				
Delay	7.6			
Level of Service	A			
Intersection Capacity Utilization	18.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	154	12	64	66	44	12	104	144	84	22	5
Future Volume (vph)	19	154	12	64	66	44	12	104	144	84	22	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	167	13	70	72	48	13	113	157	91	24	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	201	190	283	120
Volume Left (vph)	21	70	13	91
Volume Right (vph)	13	48	157	5
Hadj (s)	0.02	-0.04	-0.29	0.16
Departure Headway (s)	5.3	5.2	4.9	5.6
Degree Utilization, x	0.29	0.28	0.38	0.19
Capacity (veh/h)	626	630	682	586
Control Delay (s)	10.5	10.2	10.9	9.8
Approach Delay (s)	10.5	10.2	10.9	9.8
Approach LOS	B	B	B	A

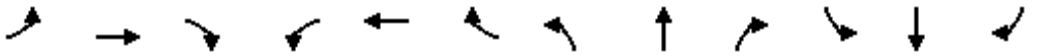
Intersection Summary				
Delay	10.5			
Level of Service	B			
Intersection Capacity Utilization	54.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	98	113	7	64	43
Future Volume (vph)	0	98	113	7	64	43
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	107	123	8	70	47

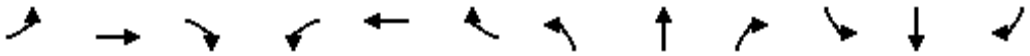
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	107	131	117
Volume Left (vph)	0	0	70
Volume Right (vph)	107	8	0
Hadj (s)	-0.57	0.00	0.15
Departure Headway (s)	3.9	4.2	4.4
Degree Utilization, x	0.12	0.15	0.14
Capacity (veh/h)	871	817	781
Control Delay (s)	7.4	8.0	8.2
Approach Delay (s)	7.4	8.0	8.2
Approach LOS	A	A	A

Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	147	48	216	117	369	54	691	286	309	581	26
Future Volume (vph)	22	147	48	216	117	369	54	691	286	309	581	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1557		1804	1794	1770	3792		2006	3986	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1557		1804	1794	1770	3792		2006	3986	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	160	52	235	127	401	59	751	311	336	632	28
RTOR Reduction (vph)	0	0	46	0	0	242	0	49	0	0	3	0
Lane Group Flow (vph)	24	160	6	0	362	159	59	1013	0	336	657	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	10.0	10.0	10.0		19.2	32.9	5.1	21.2		13.7	29.8	
Effective Green, g (s)	10.0	10.0	10.0		19.2	32.9	5.1	21.2		13.7	29.8	
Actuated g/C Ratio	0.12	0.12	0.12		0.23	0.40	0.06	0.25		0.16	0.36	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	241	223	187		416	709	108	966		330	1427	
v/s Ratio Prot	0.01	c0.09			c0.20	0.09	0.03	c0.27		c0.17	0.16	
v/s Ratio Perm			0.00									
v/c Ratio	0.10	0.72	0.03		0.87	0.22	0.55	1.05		1.02	0.46	
Uniform Delay, d1	32.6	35.2	32.3		30.8	16.7	37.9	31.0		34.8	20.5	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	8.8	0.0		17.6	0.2	3.0	42.5		54.2	0.2	
Delay (s)	32.7	44.1	32.4		48.4	16.8	40.9	73.5		89.0	20.8	
Level of Service	C	D	C		D	B	D	E		F	C	
Approach Delay (s)		40.3			31.8			71.8			43.8	
Approach LOS		D			C			E			D	

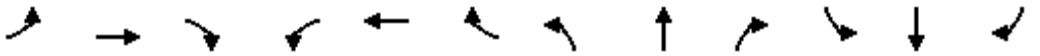
Intersection Summary			
HCM 2000 Control Delay	50.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	83.2	Sum of lost time (s)	19.1
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	801	31	42	770	52	21	0	42	24	13	53
Future Volume (Veh/h)	9	801	31	42	770	52	21	0	42	24	13	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	871	34	46	837	57	23	0	46	26	14	58
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.92			0.92	0.92	0.92	0.92	0.92	
vC, conflicting volume	894			905			1930	1894	888	1912	1882	866
vC1, stage 1 conf vol							908	908		958	958	
vC2, stage 2 conf vol							1022	986		954	925	
vCu, unblocked vol	894			854			1967	1928	836	1947	1915	866
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			94			86	100	86	85	93	84
cM capacity (veh/h)	759			724			168	223	338	170	214	353

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	915	940	69	98
Volume Left	10	46	23	26
Volume Right	34	57	46	58
cSH	759	724	253	256
Volume to Capacity	0.01	0.06	0.27	0.38
Queue Length 95th (ft)	1	5	27	43
Control Delay (s)	0.4	1.8	24.5	27.5
Lane LOS	A	A	C	D
Approach Delay (s)	0.4	1.8	24.5	27.5
Approach LOS			C	D

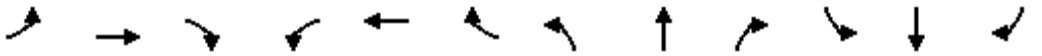
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	1116	26	61	1097	61	5	4	97	24	4	15
Future Volume (Veh/h)	9	1116	26	61	1097	61	5	4	97	24	4	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	1213	28	66	1192	66	5	4	105	26	4	16
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	1258			1242			2591	2638	1228	2697	2619	1226
vC1, stage 1 conf vol							1248	1248		1357	1357	
vC2, stage 2 conf vol							1343	1390		1340	1262	
vCu, unblocked vol	1258			1228			2651	2700	1213	2762	2680	1226
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			88			95	97	50	0	97	93
cM capacity (veh/h)	553			538			109	134	210	20	119	218

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	10	1241	66	1258	114	46
Volume Left	10	0	66	0	5	26
Volume Right	0	28	0	66	105	16
cSH	553	1700	538	1700	198	33
Volume to Capacity	0.02	0.73	0.12	0.74	0.58	1.38
Queue Length 95th (ft)	1	0	10	0	78	126
Control Delay (s)	11.6	0.0	12.6	0.0	45.3	472.7
Lane LOS	B		B		E	F
Approach Delay (s)	0.1		0.6		45.3	472.7
Approach LOS					E	F

Intersection Summary			
Average Delay	10.2		
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	1215	0	0	1250	329	0	0	0	0	0	22
Future Volume (Veh/h)	13	1215	0	0	1250	329	0	0	0	0	0	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	1321	0	0	1359	358	0	0	0	0	0	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1717			1321			2732	3066	1321	2887	2887	1538
vC1, stage 1 conf vol							1349	1349		1538	1538	
vC2, stage 2 conf vol							1383	1717		1349	1349	
vCu, unblocked vol	1717			1321			2732	3066	1321	2887	2887	1538
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	100	100	83
cM capacity (veh/h)	369			523			102	106	191	107	130	142

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	14	1321	0	1717	0	24
Volume Left	14	0	0	0	0	0
Volume Right	0	0	0	358	0	24
cSH	369	1700	1700	1700	1700	142
Volume to Capacity	0.04	0.78	0.00	1.01	0.00	0.17
Queue Length 95th (ft)	3	0	0	0	0	15
Control Delay (s)	15.2	0.0	0.0	0.0	0.0	35.3
Lane LOS	C				A	E
Approach Delay (s)	0.2		0.0		0.0	35.3
Approach LOS					A	E

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	95.8%	ICU Level of Service		F
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	83	0	0	104	87	878	23	104	704	8
Future Volume (Veh/h)	0	0	83	0	0	104	87	878	23	104	704	8
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	90	0	0	113	95	954	25	113	765	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1776	2164	770	2238	2156	490	774			979		
vC1, stage 1 conf vol	996	996		1156	1156							
vC2, stage 2 conf vol	780	1169		1081	1000							
vCu, unblocked vol	1776	2164	770	2238	2156	490	774			979		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	74	100	100	78	89			84		
cM capacity (veh/h)	115	111	344	47	140	524	837			701		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	90	113	95	636	343	113	774
Volume Left	0	0	95	0	0	113	0
Volume Right	90	113	0	0	25	0	9
cSH	344	524	837	1700	1700	701	1700
Volume to Capacity	0.26	0.22	0.11	0.37	0.20	0.16	0.46
Queue Length 95th (ft)	26	20	10	0	0	14	0
Control Delay (s)	19.2	13.7	9.8	0.0	0.0	11.1	0.0
Lane LOS	C	B	A			B	
Approach Delay (s)	19.2	13.7	0.9			1.4	
Approach LOS	C	B					

Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	185	91	77	0	52	12	25	0	25	557	44	0	19	557	47
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	205	101	85	0	58	13	28	0	28	618	49	0	21	618	52
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		391			99			695			691	
Entry Volume veh/h		383			97			681			677	
Circulating Flow (Vc), pc/h	697			851			327			99		
Exiting Flow (Vex), pc/h	171			93			851			761		
Capacity (cPCE), pc/h		563			483			815			1024	
Capacity (c), veh/h		552			473			799			1003	
v/c Ratio (X)		0.69			0.21			0.85			0.68	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.5			10.6			28.8			14.1	
Lane LOS		C			B			D			B	
95% Queue		5.4			0.8			10.2			5.5	
Approach Delay, s/veh	23.5			10.6			28.8			14.1		
Approach LOS	C			B			D			B		
Intersection Delay, s/veh / LOS	21.3						C					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - West
E/W Street Name	West Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	34	20	29	0	37	20	43	0	29	246	37	0	43	245	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	38	22	32	0	41	22	48	0	32	273	41	0	48	272	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		92			111			346			358	
Entry Volume veh/h		90			109			339			351	
Circulating Flow (Vc), pc/h	361			343			108			95		
Exiting Flow (Vex), pc/h	111			92			359			345		
Capacity (cPCE), pc/h		788			802			1014			1028	
Capacity (c), veh/h		772			786			994			1007	
v/c Ratio (X)		0.12			0.14			0.34			0.35	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.9			6.0			7.2			7.2	
Lane LOS		A			A			A			A	
95% Queue		0.4			0.5			1.5			1.6	
Approach Delay, s/veh	5.9			6.0			7.2			7.2		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.9						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Kelly Street
E/W Street Name	Kelly Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	39	16	13	0	8	6	151	0	3	315	8	0	141	305	59
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	43	18	14	0	9	7	167	0	3	349	9	0	156	338	65
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		75			183			361			559	
Entry Volume veh/h		74			179			354			548	
Circulating Flow (Vc), pc/h	503			395			217			19		
Exiting Flow (Vex), pc/h	183			75			559			361		
Capacity (cPCE), pc/h		683			761			910			1109	
Capacity (c), veh/h		670			746			892			1087	
v/c Ratio (X)		0.11			0.24			0.40			0.50	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.6			7.5			8.7			9.2	
Lane LOS		A			A			A			A	
95% Queue		0.4			0.9			1.9			2.9	
Approach Delay, s/veh	6.6			7.5			8.7			9.2		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	8.6						A					

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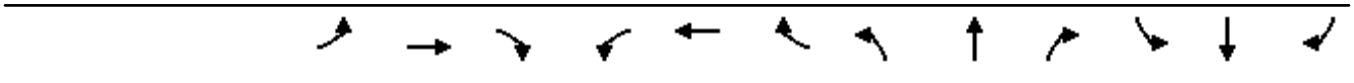


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Future Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				112	0	0	14	1151	0	26	2405	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				738	0	329	92	3173	988	92	2208	988
Arrive On Green				0.20	0.00	0.00	0.05	0.60	0.00	0.05	0.60	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				112	0	0	14	1151	0	26	2405	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Cycle Q Clear(g_c), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				738	0	329	92	3173	988	92	2208	988
V/C Ratio(X)				0.15	0.00	0.00	0.15	0.36	0.00	0.28	1.09	0.00
Avail Cap(c_a), veh/h				738	0	329	92	3173	988	92	2208	988
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				26.4	0.0	0.0	36.4	8.2	0.0	36.6	16.0	0.0
Incr Delay (d2), s/veh				0.4	0.0	0.0	3.5	0.3	0.0	7.5	48.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.0	0.4	4.4	0.0	0.7	38.7	0.0
LnGrp Delay(d),s/veh				26.8	0.0	0.0	39.8	8.5	0.0	44.1	64.3	0.0
LnGrp LOS				C			D	A		D	F	
Approach Vol, veh/h					112			1165			2431	
Approach Delay, s/veh					26.8			8.9			64.1	
Approach LOS					C			A			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	52.0			8.0	52.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	48.0			4.0	48.0		16.0
Max Q Clear Time (g_c+I1), s	3.1	10.9			2.6	50.0		4.0
Green Ext Time (p_c), s	0.0	10.6			0.0	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1123	209	317	1287	0	0
Future Volume (veh/h)	1123	209	317	1287	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	1221	227	345	1399		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	2116	947	805	3313		
Arrive On Green	0.57	0.57	0.22	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	1221	227	345	1399		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	8.4	2.7	3.3	2.5		
Cycle Q Clear(g_c), s	8.4	2.7	3.3	2.5		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2116	947	805	3313		
V/C Ratio(X)	0.58	0.24	0.43	0.42		
Avail Cap(c_a), veh/h	2116	947	805	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.4	4.2	13.3	0.3		
Incr Delay (d2), s/veh	1.2	0.6	1.7	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.4	1.4	1.8	1.2		
LnGrp Delay(d),s/veh	6.6	4.8	15.0	0.7		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1448			1744		
Approach Delay, s/veh	6.3			3.5		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			13.0	27.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			9.0	23.0				36.0
Max Q Clear Time (g_c+I1), s			5.3	10.4				4.5
Green Ext Time (p_c), s			0.5	7.5				13.7

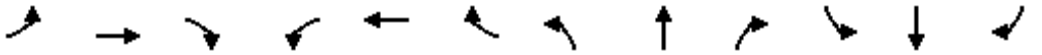
Intersection Summary	
HCM 2010 Ctrl Delay	4.8
HCM 2010 LOS	A



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1740	97	305	1324	156	0
Future Volume (veh/h)	1740	97	305	1324	156	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1891	105	332	1439	170	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1840	823	358	2419	422	376
Arrive On Green	0.50	0.50	0.10	0.66	0.23	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	1891	105	332	1439	170	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	35.0	2.4	6.4	15.4	5.5	0.0
Cycle Q Clear(g_c), s	35.0	2.4	6.4	15.4	5.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1840	823	358	2419	422	376
V/C Ratio(X)	1.03	0.13	0.93	0.59	0.40	0.00
Avail Cap(c_a), veh/h	1840	823	358	2419	422	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.5	9.3	31.2	6.8	22.9	0.0
Incr Delay (d2), s/veh	28.3	0.3	32.3	1.1	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	24.9	1.2	4.8	8.0	3.1	0.0
LnGrp Delay(d),s/veh	45.8	9.7	63.6	7.8	25.8	0.0
LnGrp LOS	F	A	E	A	C	
Approach Vol, veh/h	1996			1771	170	
Approach Delay, s/veh	43.9			18.3	25.8	
Approach LOS	D			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	11.0	39.0				50.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	7.0	35.0				46.0
Max Q Clear Time (g_c+I1), s		7.5	8.4	37.0				17.4
Green Ext Time (p_c), s		0.3	0.0	0.0				13.6

Intersection Summary	
HCM 2010 Ctrl Delay	31.6
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Future Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	680	7	89	633	0	5	0	34	90	0	53
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1244	13	217	1949	872	0	0	0	1158	0	517
Arrive On Green	0.00	0.33	0.33	0.12	0.53	0.00	0.00	0.00	0.00	0.31	0.00	0.31
Sat Flow, veh/h	0	3829	38	1845	3681	1647		0		3690	0	1647
Grp Volume(v), veh/h	0	335	352	89	633	0		0.0		90	0	53
Grp Sat Flow(s),veh/h/ln	0	1840	1930	1845	1840	1647				1845	0	1647
Q Serve(g_s), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Cycle Q Clear(g_c), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	613	643	217	1949	872				1158	0	517
V/C Ratio(X)	0.00	0.55	0.55	0.41	0.32	0.00				0.08	0.00	0.10
Avail Cap(c_a), veh/h	0	613	643	217	1949	872				1158	0	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.9	13.9	20.9	6.8	0.0				12.3	0.0	12.4
Incr Delay (d2), s/veh	0.0	3.5	3.3	5.6	0.4	0.0				0.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.4	4.6	1.5	2.6	0.0				0.5	0.0	0.6
LnGrp Delay(d),s/veh	0.0	17.3	17.2	26.5	7.3	0.0				12.4	0.0	12.8
LnGrp LOS		B	B	C	A					B		B
Approach Vol, veh/h		687			722						143	
Approach Delay, s/veh		17.3			9.6						12.6	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			10.0	21.0		20.0		31.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			6.0	17.0		16.0		27.0
Max Q Clear Time (g_c+I1), s			4.3	9.6		3.2		7.0
Green Ext Time (p_c), s			0.0	2.5		0.3		4.3

Intersection Summary	
HCM 2010 Ctrl Delay	13.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Future Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	195	751	10	30	1102	325	10	2	16	202	169	79
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	1209	16	115	1058	473	329	66	350	369	250	117
Arrive On Green	0.10	0.32	0.32	0.06	0.29	0.29	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1845	3719	50	1845	3681	1647	1550	310	1647	1845	1250	584
Grp Volume(v), veh/h	195	372	389	30	1102	325	12	0	16	202	0	248
Grp Sat Flow(s),veh/h/ln	1845	1840	1929	1845	1840	1647	1860	0	1647	1845	0	1834
Q Serve(g_s), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Cycle Q Clear(g_c), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Prop In Lane	1.00		0.03	1.00		1.00	0.83		1.00	1.00		0.32
Lane Grp Cap(c), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
V/C Ratio(X)	1.06	0.62	0.62	0.26	1.04	0.69	0.03	0.00	0.05	0.55	0.00	0.68
Avail Cap(c_a), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	22.8	22.8	35.7	28.5	25.3	25.0	0.0	25.0	28.7	0.0	29.6
Incr Delay (d2), s/veh	82.1	4.8	4.6	5.4	39.0	7.9	0.1	0.0	0.2	5.7	0.0	9.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	7.7	8.0	0.8	17.3	7.4	0.2	0.0	0.3	4.6	0.0	6.0
LnGrp Delay(d),s/veh	118.1	27.6	27.4	41.1	67.5	33.2	25.1	0.0	25.3	34.5	0.0	39.2
LnGrp LOS	F	C	C	D	F	C	C		C	C		D
Approach Vol, veh/h		956			1457			28			450	
Approach Delay, s/veh		46.0			59.3			25.2			37.1	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	30.0		20.0	12.0	27.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	26.0		16.0	8.0	23.0
Max Q Clear Time (g_c+I1), s		2.6	3.2	15.7		12.0	10.0	25.0
Green Ext Time (p_c), s		0.0	0.0	3.5		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	51.1
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Future Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	838	272	98	1080	483	394	413	351	394	413	351
Arrive On Green	0.07	0.31	0.31	0.05	0.29	0.29	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1845	2732	888	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	66	634	617	96	832	201	250	306	153	368	411	424
Grp Sat Flow(s),veh/h/ln	1845	1840	1780	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Cycle Q Clear(g_c), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Prop In Lane	1.00		0.50	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
V/C Ratio(X)	0.54	1.12	1.13	0.98	0.77	0.42	0.64	0.74	0.44	0.93	0.99	1.21
Avail Cap(c_a), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.9	26.0	26.0	35.5	24.2	21.3	26.8	27.6	25.6	29.0	29.5	29.5
Incr Delay (d2), s/veh	15.8	76.4	79.7	84.3	5.3	2.6	7.6	11.3	3.9	31.6	42.9	116.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	23.6	23.3	4.3	8.7	3.7	5.6	7.2	3.1	10.9	13.4	18.6
LnGrp Delay(d),s/veh	49.6	102.4	105.7	119.7	29.5	24.0	34.5	38.9	29.5	60.6	72.4	146.4
LnGrp LOS	D	F	F	F	C	C	C	D	C	E	E	F
Approach Vol, veh/h		1317			1129			709			1203	
Approach Delay, s/veh		101.3			36.2			35.3			94.9	
Approach LOS		F			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	27.0		20.0	9.0	26.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	23.0		16.0	5.0	22.0
Max Q Clear Time (g_c+I1), s		13.1	5.9	25.0		18.0	4.6	17.5
Green Ext Time (p_c), s		1.0	0.0	0.0		0.0	0.0	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	71.9
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Future Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	85	8	8	93	10	4	5	9	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	24%	21%	7%
Vol Thru, %	29%	72%	84%
Vol Right, %	47%	6%	9%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	17	108	102
LT Vol	4	23	7
Through Vol	5	78	86
RT Vol	8	7	9
Lane Flow Rate	18	117	111
Geometry Grp	1	1	1
Degree of Util (X)	0.021	0.132	0.124
Departure Headway (Hd)	4.088	4.052	4.014
Convergence, Y/N	Yes	Yes	Yes
Cap	860	884	891
Service Time	2.187	2.083	2.047
HCM Lane V/C Ratio	0.021	0.132	0.125
HCM Control Delay	7.3	7.7	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.4

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Future Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	212	60	34	38	0	0	0	0	30	0	50

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	212	0	0			318	318	38
Stage 1	-	-	-	-	-	-			106	106	-
Stage 2	-	-	-	-	-	-			212	212	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1358	-	0			675	598	1034
Stage 1	0	-	-	-	-	0			918	807	-
Stage 2	0	-	-	-	-	0			823	727	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1358	-	-			657	0	1034
Mov Cap-2 Maneuver	-	-	-	-	-	-			657	0	-
Stage 1	-	-	-	-	-	-			894	0	-
Stage 2	-	-	-	-	-	-			823	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	3.6	9.5
HCM LOS			A

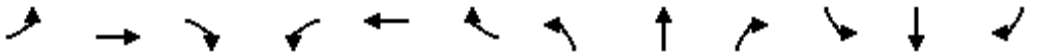
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1358	-	657	1034
HCM Lane V/C Ratio	-	-	0.025	-	0.046	0.048
HCM Control Delay (s)	-	-	7.7	0	10.7	8.7
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	945	137	935	1632	56	1428
Future Volume (veh/h)	945	137	935	1632	56	1428
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1027	0	1016	1774	61	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1302	583	1211	1401	397	624
Arrive On Green	0.35	0.00	0.34	0.72	0.22	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	1027	0	1016	1774	61	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	32.5	0.0	34.1	94.0	3.5	0.0
Cycle Q Clear(g_c), s	32.5	0.0	34.1	94.0	3.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1302	583	1211	1401	397	624
V/C Ratio(X)	0.79	0.00	0.84	1.27	0.15	0.00
Avail Cap(c_a), veh/h	1302	583	1211	1401	397	624
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.6	0.0	39.7	18.0	41.4	0.0
Incr Delay (d2), s/veh	4.9	0.0	7.0	125.7	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.4	0.0	18.0	98.3	1.9	0.0
LnGrp Delay(d),s/veh	42.5	0.0	46.8	143.7	42.2	0.0
LnGrp LOS	D		D	F	D	
Approach Vol, veh/h	1027			2790	61	
Approach Delay, s/veh	42.5			108.4	42.2	
Approach LOS	D			F	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		32.0	48.0	50.0				98.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		28.0	44.0	46.0				94.0
Max Q Clear Time (g_c+I1), s		5.5	36.1	34.5				96.0
Green Ext Time (p_c), s		0.1	2.8	5.5				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	89.9
HCM 2010 LOS	F

Appendix K.2 – Analysis Output Sheets (Future with Project Alternative 1 Existing SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	81	61	94	302	563	169	18	141	82	23	69
Future Volume (vph)	89	81	61	94	302	563	169	18	141	82	23	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3145	1441		1782	1583		1793	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3145	1441		1782	1583		1793	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	88	66	102	328	612	184	20	153	89	25	75
RTOR Reduction (vph)	0	0	58	0	226	253	0	0	91	0	0	57
Lane Group Flow (vph)	97	88	8	102	408	53	0	204	62	0	114	18
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Effective Green, g (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Actuated g/C Ratio	0.07	0.11	0.11	0.11	0.17	0.17		0.29	0.29		0.23	0.23
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	132	212	180	199	546	250		518	460		419	369
v/s Ratio Prot	0.05	0.05		c0.06	c0.13			c0.11			c0.06	
v/s Ratio Perm			0.00			0.04			0.04			0.01
v/c Ratio	0.73	0.42	0.04	0.51	0.75	0.21		0.39	0.13		0.27	0.05
Uniform Delay, d1	33.3	30.3	29.0	30.7	28.9	26.1		20.9	19.3		23.1	21.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	19.0	0.5	0.0	2.2	4.9	0.2		2.2	0.6		1.6	0.2
Delay (s)	52.3	30.8	29.1	33.0	33.8	26.2		23.1	19.9		24.7	22.1
Level of Service	D	C	C	C	C	C		C	B		C	C
Approach Delay (s)		38.7			31.5			21.7			23.7	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	18.3
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	409	0	381	0	0	179	464	0	121	166	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	0	0	0	0	453	0	414	0	0	198	514	0	134	184	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929		4.6453	4.3276			4.3276		4.6453	4.3276	
Follow-Up Headway (s)		3.1858		2.6667	2.5352			2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		0		0	453	414		198	514	134	184	
Entry Volume veh/h		0		0	444	414		194	504	131	180	
Circulating Flow (v_c), pc/h	771			198			134			453		
Exiting Flow (v_{ex}), pc/h	134			0			198			637		
Capacity (c_{pce}), pc/h		523		1125	1200			1267		890	966	
Capacity (c), veh/h		512		1103	1177			1242		872	947	
v/c Ratio (x)		0.00		0.00	0.38			0.16		0.15	0.19	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.0		3.3	6.8	0.0		4.2	0.0	5.6	5.6	
Lane LOS		A		A	A	A		A	A	A	A	
95% Queue, veh		0.0		0.0	1.8			0.6		0.5	0.7	
Approach Delay, s/veh				3.5			1.2			5.6		
Approach LOS				A			A			A		
Intersection Delay, s/veh | LOS	3.0						A					

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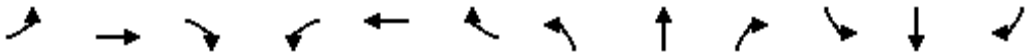

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	21	4	43	27	84	12	58	62	125	79	6
Future Volume (vph)	2	21	4	43	27	84	12	58	62	125	79	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	23	4	47	29	91	13	63	67	136	86	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	29	167	143	229
Volume Left (vph)	2	47	13	136
Volume Right (vph)	4	91	67	7
Hadj (s)	-0.03	-0.24	-0.23	0.13
Departure Headway (s)	5.0	4.6	4.4	4.7
Degree Utilization, x	0.04	0.21	0.18	0.30
Capacity (veh/h)	650	726	767	732
Control Delay (s)	8.2	8.8	8.4	9.7
Approach Delay (s)	8.2	8.8	8.4	9.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	40.4%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Surfrider Way
E/W Street Name	Surfrider Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1
Lane Assignment			LTR				LTR				LTR		LT		R	
Volume (V), veh/h	0	11	8	17	0	2	13	3	0	13	331	2	0	2	360	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	12	9	19	0	2	14	3	0	14	367	2	0	2	399	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929		4.5436	4.5436	
Follow-Up Headway (s)		3.1858			3.1858			3.1858		2.5352	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		40			19			383		401	38	
Entry Volume veh/h		39			19			375		393	37	
Circulating Flow (v_c), pc/h	403			393			23			30		
Exiting Flow (v_{ex}), pc/h	13			66			382			420		
Capacity (c_{pce}), pc/h		755			763			1104		1382	1382	
Capacity (c), veh/h		740			748			1083		1355	1355	
v/c Ratio (x)		0.05			0.02			0.35		0.29	0.03	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.4			5.1			6.8		5.2	2.9	
Lane LOS		A			A			A		A	A	
95% Queue, veh		0.2			0.1			1.6		1.2	0.1	
Approach Delay, s/veh	5.4			5.1			6.8			5.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.8						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Civic Center Drive
Agency or Co.	IBI Group	E/W Street Name	Civic Center Drive
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	12	9	8	0	22	13	21	0	7	280	27	0	60	333	12
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	13	10	9	0	24	14	23	0	8	310	30	0	67	369	13
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		32			61			348			449	
Entry Volume veh/h		31			60			341			440	
Circulating Flow (v_c), pc/h	460			331			90			46		
Exiting Flow (v_{ex}), pc/h	107			35			346			402		
Capacity (c_{pce}), pc/h		713			812			1033			1079	
Capacity (c), veh/h		699			796			1013			1058	
v/c Ratio (x)		0.04			0.08			0.34			0.42	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.6			5.3			7.0			7.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.1			0.2			1.5			2.1	
Approach Delay, s/veh	5.6			5.3			7.0			7.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.3						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Pier View Way
Agency or Co.	IBI Group	E/W Street Name	Pier View Way
Date Performed	7/11/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	11	8	17	0	2	13	3	0	13	331	2	0	2	360	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	12	9	19	0	2	14	3	0	14	367	2	0	2	399	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		40			19			383			439	
Entry Volume veh/h		39			19			375			430	
Circulating Flow (v_c), pc/h	403			393			23			30		
Exiting Flow (v_{ex}), pc/h	13			66			382			420		
Capacity (c_{pce}), pc/h		755			763			1104			1097	
Capacity (c), veh/h		740			748			1083			1075	
v/c Ratio (x)		0.05			0.02			0.35			0.40	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.4			5.1			6.8			7.6	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.1			1.6			2.0	
Approach Delay, s/veh	5.4			5.1			6.8			7.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.1						A					

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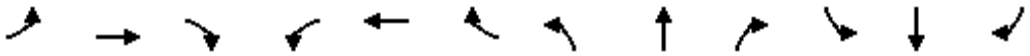


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	3	19	9	6	4	89	222	3	5	152	7
Future Volume (vph)	2	3	19	9	6	4	89	222	3	5	152	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	3	21	10	7	4	97	241	3	5	165	8

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	5	21	21	218	124	88	91
Volume Left (vph)	2	0	10	97	0	5	0
Volume Right (vph)	0	21	4	0	3	0	8
Hadj (s)	0.23	-0.67	0.01	0.26	0.02	0.06	-0.03
Departure Headway (s)	5.9	5.0	5.7	5.0	4.8	5.0	4.9
Degree Utilization, x	0.01	0.03	0.03	0.30	0.16	0.12	0.12
Capacity (veh/h)	559	655	585	703	735	701	717
Control Delay (s)	7.8	7.0	8.9	9.0	7.5	7.5	7.4
Approach Delay (s)	7.1		8.9	8.5		7.4	
Approach LOS	A		A	A		A	

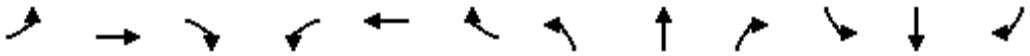
Intersection Summary				
Delay	8.1			
Level of Service	A			
Intersection Capacity Utilization	31.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	125	57	130	88	33	114
Future Volume (vph)	125	57	130	88	33	114
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	136	62	141	96	36	124

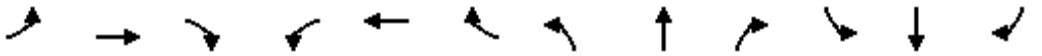
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	136	62	237	160
Volume Left (vph)	136	0	0	36
Volume Right (vph)	0	62	96	0
Hadj (s)	0.53	-0.67	-0.21	0.08
Departure Headway (s)	6.0	4.8	4.4	4.8
Degree Utilization, x	0.23	0.08	0.29	0.21
Capacity (veh/h)	568	706	777	710
Control Delay (s)	9.5	7.0	9.3	9.1
Approach Delay (s)	8.7		9.3	9.1
Approach LOS	A		A	A

Intersection Summary			
Delay	9.0		
Level of Service	A		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	123	35	160	32	0	0	0	0	30	40
Future Volume (vph)	18	0	123	35	160	32	0	0	0	0	30	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.92	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3450						3239	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3450						3239	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	0	134	38	174	35	0	0	0	0	33	43
RTOR Reduction (vph)	0	0	122	14	13	0	0	0	0	0	40	0
Lane Group Flow (vph)	20	0	12	24	196	0	0	0	0	0	36	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	5.2		5.2	37.2	37.2						4.1	
Effective Green, g (s)	5.2		5.2	37.2	37.2						4.1	
Actuated g/C Ratio	0.09		0.09	0.62	0.62						0.07	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	153		241	1097	2139						221	
v/s Ratio Prot	c0.01		0.00	0.01	c0.06						c0.01	
v/s Ratio Perm												
v/c Ratio	0.13		0.05	0.02	0.09						0.16	
Uniform Delay, d1	25.3		25.1	4.4	4.6						26.3	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.4		0.1	0.0	0.1						0.3	
Delay (s)	25.7		25.2	4.4	4.7						26.7	
Level of Service	C		C	A	A						C	
Approach Delay (s)		25.3			4.6			0.0			26.7	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	139	226	72	69	507	0	0	289	32
Future Volume (vph)	0	0	0	139	226	72	69	507	0	0	289	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1526	1770	1863			1766	1461
Flt Permitted				0.95	1.00	1.00	0.43	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1526	796	1863			1766	1461
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	151	246	78	75	551	0	0	314	35
RTOR Reduction (vph)	0	0	0	0	0	54	0	0	0	0	1	23
Lane Group Flow (vph)	0	0	0	151	246	24	75	551	0	0	317	8
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.1	18.1	18.1	30.8	30.8			15.7	15.7
Effective Green, g (s)				18.1	18.1	18.1	30.8	30.8			15.7	15.7
Actuated g/C Ratio				0.31	0.31	0.31	0.52	0.52			0.27	0.27
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				543	1087	468	583	974			470	389
v/s Ratio Prot				c0.09	0.07		0.02	c0.30			c0.18	
v/s Ratio Perm						0.02	0.05					0.01
v/c Ratio				0.28	0.23	0.05	0.13	0.57			0.68	0.02
Uniform Delay, d1				15.5	15.2	14.4	9.9	9.5			19.3	15.9
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				1.3	0.5	0.2	0.1	0.9			4.2	0.0
Delay (s)				16.7	15.7	14.6	10.1	10.4			23.5	16.0
Level of Service				B	B	B	B	B			C	B
Approach Delay (s)		0.0			15.8			10.4			22.8	
Approach LOS		A			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	111	1	123	416	202	11	24	185	135	47	6
Future Volume (vph)	23	111	1	123	416	202	11	24	185	135	47	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3535		1770	3539	1583		1834	1583	1681	1714	
Flt Permitted	0.45	1.00		0.67	1.00	1.00		0.94	1.00	0.73	0.90	
Satd. Flow (perm)	846	3535		1257	3539	1583		1752	1583	1296	1570	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	121	1	134	452	220	12	26	201	147	51	7
RTOR Reduction (vph)	0	1	0	0	0	161	0	0	89	0	3	0
Lane Group Flow (vph)	25	121	0	134	452	59	0	38	112	101	101	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	15.1	15.1		14.7	14.7	14.7		30.7	30.7	30.7	30.7	
Effective Green, g (s)	15.1	15.1		14.7	14.7	14.7		30.7	30.7	30.7	30.7	
Actuated g/C Ratio	0.27	0.27		0.27	0.27	0.27		0.56	0.56	0.56	0.56	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	232	970		335	945	423		977	883	723	876	
v/s Ratio Prot		0.03			c0.13							
v/s Ratio Perm	0.03			0.11		0.04		0.02	0.07	c0.08	0.06	
v/c Ratio	0.11	0.13		0.40	0.48	0.14		0.04	0.13	0.14	0.12	
Uniform Delay, d1	14.9	15.0		16.5	16.9	15.3		5.5	5.8	5.8	5.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.1		0.9	0.5	0.2		0.1	0.3	0.4	0.3	
Delay (s)	15.2	15.1		17.5	17.4	15.5		5.6	6.1	6.2	6.0	
Level of Service	B	B		B	B	B		A	A	A	A	
Approach Delay (s)		15.1			16.9			6.0			6.1	
Approach LOS		B			B			A			A	

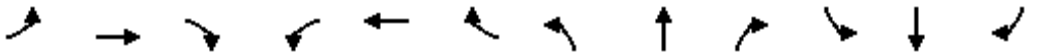
Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	78	6	22	28	6	9
Future Volume (Veh/h)	78	6	22	28	6	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	85	7	24	30	7	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			92		166	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			92		166	88
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	99
cM capacity (veh/h)			1503		811	970

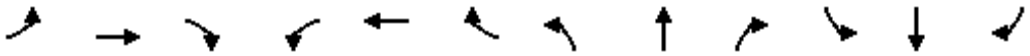
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	92	54	17
Volume Left	0	24	7
Volume Right	7	0	10
cSH	1700	1503	897
Volume to Capacity	0.05	0.02	0.02
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	3.4	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	3.4	9.1
Approach LOS			A

Intersection Summary			
Average Delay		2.1	
Intersection Capacity Utilization		19.4%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	53	99	0	0	0	28	215	58	68	208	55
Future Volume (vph)	93	53	99	0	0	0	28	215	58	68	208	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.95				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1498				1770	1863	1552	1770	1863	1518
Flt Permitted	0.95	1.00	1.00				0.62	1.00	1.00	0.45	1.00	1.00
Satd. Flow (perm)	1770	1863	1498				1150	1863	1552	831	1863	1518
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	58	108	0	0	0	30	234	63	74	226	60
RTOR Reduction (vph)	0	0	60	0	0	0	0	0	45	0	0	36
Lane Group Flow (vph)	101	58	48	0	0	0	30	234	18	74	226	24
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	24.3	24.3	24.3				15.5	15.5	15.5	21.9	21.9	21.9
Effective Green, g (s)	24.3	24.3	24.3				15.5	15.5	15.5	21.9	21.9	21.9
Actuated g/C Ratio	0.44	0.44	0.44				0.28	0.28	0.28	0.40	0.40	0.40
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	782	823	661				324	525	437	371	741	604
v/s Ratio Prot	c0.06	0.03						c0.13		0.01	c0.12	
v/s Ratio Perm			0.03				0.03		0.01	0.07		0.02
v/c Ratio	0.13	0.07	0.07				0.09	0.45	0.04	0.20	0.30	0.04
Uniform Delay, d1	9.1	8.8	8.9				14.6	16.2	14.3	10.7	11.3	10.1
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	0.2				0.6	2.7	0.2	0.3	1.1	0.1
Delay (s)	9.4	9.0	9.1				15.1	18.9	14.5	10.9	12.4	10.2
Level of Service	A	A	A				B	B	B	B	B	B
Approach Delay (s)		9.2			0.0			17.7			11.7	
Approach LOS		A			A			B			B	

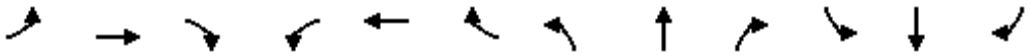
Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	188	9	0	0	0	0	4	16	21	8	0
Future Volume (Veh/h)	11	188	9	0	0	0	0	4	16	21	8	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	204	10	0	0	0	0	4	17	23	9	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			214			238	233	107	145	238	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			214			238	233	107	145	238	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	98	97	99	100
cM capacity (veh/h)	1622			1353			686	661	926	787	657	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	114	112	21	32
Volume Left	12	0	0	23
Volume Right	0	10	17	0
cSH	1622	1700	861	745
Volume to Capacity	0.01	0.07	0.02	0.04
Queue Length 95th (ft)	1	0	2	3
Control Delay (s)	0.8	0.0	9.3	10.0
Lane LOS	A		A	B
Approach Delay (s)	0.4		9.3	10.0
Approach LOS			A	B

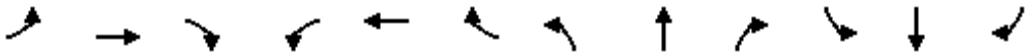
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	20.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	23	425	4	0	0	0	0	4	20	14	13	0
Future Volume (vph)	23	425	4	0	0	0	0	4	20	14	13	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	462	4	0	0	0	0	4	22	15	14	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	256	235	26	29
Volume Left (vph)	25	0	0	15
Volume Right (vph)	0	4	22	0
Hadj (s)	0.08	0.02	-0.47	0.14
Departure Headway (s)	4.7	4.7	4.5	5.1
Degree Utilization, x	0.34	0.30	0.03	0.04
Capacity (veh/h)	754	760	744	656
Control Delay (s)	8.9	8.5	7.6	8.3
Approach Delay (s)	8.7		7.6	8.3
Approach LOS	A		A	A

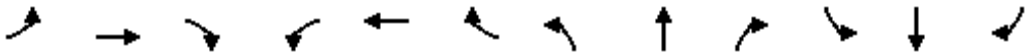
Intersection Summary				
Delay	8.6			
Level of Service	A			
Intersection Capacity Utilization	27.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	90	171	9	39	0	91	0	45	29	0	0	0
Future Volume (vph)	90	171	9	39	0	91	0	45	29	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	186	10	42	0	99	0	49	32	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	98	196	141	81
Volume Left (vph)	98	0	42	0
Volume Right (vph)	0	10	99	32
Hadj (s)	0.53	0.00	-0.33	-0.20
Departure Headway (s)	5.3	4.8	4.2	4.7
Degree Utilization, x	0.15	0.26	0.16	0.10
Capacity (veh/h)	662	732	826	716
Control Delay (s)	8.0	8.3	8.0	8.2
Approach Delay (s)	8.2		8.0	8.2
Approach LOS	A		A	A

Intersection Summary				
Delay	8.2			
Level of Service	A			
Intersection Capacity Utilization	31.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	13	0	0	31	13	235	20	14	243	6
Future Volume (Veh/h)	0	0	13	0	0	31	13	235	20	14	243	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	14	0	0	34	14	255	22	15	264	7
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked												
vC, conflicting volume	622	616	274	609	609	273	278			284		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	622	616	274	609	609	273	278			284		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	96	99			99		
cM capacity (veh/h)	369	391	760	386	395	760	1277			1268		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	14	34	14	277	15	271
Volume Left	0	0	14	0	15	0
Volume Right	14	34	0	22	0	7
cSH	760	760	1277	1700	1268	1700
Volume to Capacity	0.02	0.04	0.01	0.16	0.01	0.16
Queue Length 95th (ft)	1	4	1	0	1	0
Control Delay (s)	9.8	10.0	7.8	0.0	7.9	0.0
Lane LOS	A	A	A		A	
Approach Delay (s)	9.8	10.0	0.4		0.4	
Approach LOS	A	A				

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	23.6%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Washington Avenue
Agency or Co.	IBI Group	E/W Street Name	Washington Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	2	25	0	37	6	4	0	18	241	11	0	3	251	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	16	2	28	0	41	7	4	0	20	267	12	0	3	278	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		46			52			299			301	
Entry Volume veh/h		45			51			293			295	
Circulating Flow (v_c), pc/h	322			303			21			68		
Exiting Flow (v_{ex}), pc/h	17			47			287			347		
Capacity (c_{pce}), pc/h		819			835			1107			1056	
Capacity (c), veh/h		803			818			1085			1035	
v/c Ratio (x)		0.06			0.06			0.27			0.29	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.0			5.0			5.9			6.3	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.2			1.1			1.2	
Approach Delay, s/veh	5.0			5.0			5.9			6.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.9						A					

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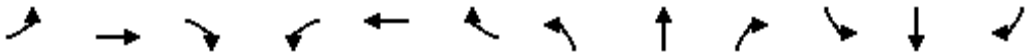
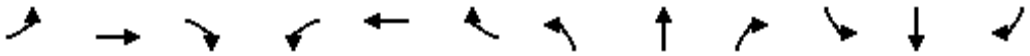


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	22	29	18	26	4	80	3	152	41	95	104	1
Future Volume (vph)	22	29	18	26	4	80	3	152	41	95	104	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	32	20	28	4	87	3	165	45	103	113	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	76	119	213	217
Volume Left (vph)	24	28	3	103
Volume Right (vph)	20	87	45	1
Hadj (s)	-0.06	-0.36	-0.09	0.13
Departure Headway (s)	5.0	4.7	4.6	4.8
Degree Utilization, x	0.11	0.15	0.27	0.29
Capacity (veh/h)	642	695	748	715
Control Delay (s)	8.6	8.5	9.3	9.7
Approach Delay (s)	8.6	8.5	9.3	9.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.2			
Level of Service	A			
Intersection Capacity Utilization	39.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	204	24	5	94	16	12	26	30	22	36	12
Future Volume (Veh/h)	8	204	24	5	94	16	12	26	30	22	36	12
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	222	26	5	102	17	13	28	33	24	39	13
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	133			255			414	403	242	434	408	126
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	133			255			414	403	242	434	408	126
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			97	95	96	95	92	99
cM capacity (veh/h)	1435			1302			496	522	792	473	519	913

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	257	124	74	76
Volume Left	9	5	13	24
Volume Right	26	17	33	13
cSH	1435	1302	609	542
Volume to Capacity	0.01	0.00	0.12	0.14
Queue Length 95th (ft)	0	0	10	12
Control Delay (s)	0.3	0.3	11.7	12.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	11.7	12.7
Approach LOS			B	B

Intersection Summary				
Average Delay	3.7			
Intersection Capacity Utilization	28.7%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	53	53	134	0	87	28	27	0	65	251	62	0	16	276	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	59	59	149	0	96	31	30	0	72	278	69	0	18	306	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		267			157			419			344	
Entry Volume veh/h		262			154			411			337	
Circulating Flow (v_c), pc/h		420			409			136			199	
Exiting Flow (v_{ex}), pc/h		146			123			367			551	
Capacity (c_{pce}), pc/h		742			751			986			926	
Capacity (c), veh/h		728			736			967			908	
v/c Ratio (x)		0.36			0.21			0.42			0.37	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.5			7.2			8.6			8.1	
Lane LOS		A			A			A			A	
95% Queue, veh		1.6			0.8			2.1			1.7	
Approach Delay, s/veh	9.5			7.2			8.6			8.1		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.5						A					

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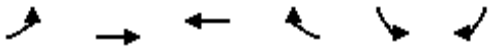
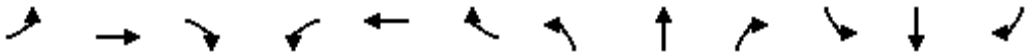


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	208	201	5	16	15
Future Volume (Veh/h)	8	208	201	5	16	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	226	218	5	17	16
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	231				474	230
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	231				474	230
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	98
cM capacity (veh/h)	1328				542	804

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	235	223	33
Volume Left	9	0	17
Volume Right	0	5	16
cSH	1328	1700	643
Volume to Capacity	0.01	0.13	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.4	0.0	10.9
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	10.9
Approach LOS			B

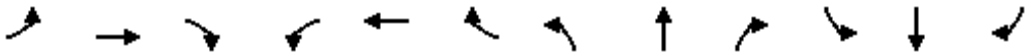
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	193	9	20	182	11	5	5	13	33	1	5
Future Volume (Veh/h)	7	193	9	20	182	11	5	5	13	33	1	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	210	10	22	198	12	5	5	14	36	1	5
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	212			220			486	487	215	498	486	208
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	212			220			486	487	215	498	486	208
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			99	99	98	92	100	99
cM capacity (veh/h)	1356			1349			478	469	825	462	470	830

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	228	232	24	42
Volume Left	8	22	5	36
Volume Right	10	12	14	5
cSH	1356	1349	630	488
Volume to Capacity	0.01	0.02	0.04	0.09
Queue Length 95th (ft)	0	1	3	7
Control Delay (s)	0.3	0.9	10.9	13.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.9	10.9	13.1
Approach LOS			B	B

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	32.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	111	175	69	141	0	94	0	35	0	0	0
Future Volume (vph)	0	111	175	69	141	0	94	0	35	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	121	190	75	153	0	102	0	38	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	311	228	140	0
Volume Left (vph)	0	75	102	0
Volume Right (vph)	190	0	38	0
Hadj (s)	-0.33	0.10	0.02	0.00
Departure Headway (s)	4.2	4.7	5.1	5.3
Degree Utilization, x	0.36	0.30	0.20	0.00
Capacity (veh/h)	822	729	643	595
Control Delay (s)	9.6	9.7	9.4	8.3
Approach Delay (s)	9.6	9.7	9.4	0.0
Approach LOS	A	A	A	A

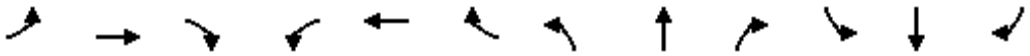
Intersection Summary				
Delay	9.6			
Level of Service	A			
Intersection Capacity Utilization	49.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	51	69	101	32	81	121
Future Volume (vph)	51	69	101	32	81	121
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	75	110	35	88	132

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	130	145	220
Volume Left (vph)	55	0	88
Volume Right (vph)	75	35	0
Hadj (s)	-0.23	-0.11	0.11
Departure Headway (s)	4.5	4.4	4.5
Degree Utilization, x	0.16	0.18	0.27
Capacity (veh/h)	738	791	770
Control Delay (s)	8.4	8.3	9.2
Approach Delay (s)	8.4	8.3	9.2
Approach LOS	A	A	A

Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	235	1	6	189	40	7	10	11	40	16	10
Future Volume (Veh/h)	8	235	1	6	189	40	7	10	11	40	16	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	255	1	7	205	43	8	11	12	43	17	11
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.93						0.93	0.93		0.93	0.93	0.93
vC, conflicting volume	251			267			548	550	274	542	528	234
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	153			267			474	475	274	467	452	134
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	98	98	90	96	99
cM capacity (veh/h)	1320			1285			432	442	752	441	455	843

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	265	255	31	71
Volume Left	9	7	8	43
Volume Right	1	43	12	11
cSH	1320	1285	522	480
Volume to Capacity	0.01	0.01	0.06	0.15
Queue Length 95th (ft)	1	0	5	13
Control Delay (s)	0.3	0.3	12.3	13.8
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	12.3	13.8
Approach LOS			B	B

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Oceanside Blvd
E/W Street Name	Oceanside Boulevard
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	21	132	76	0	112	134	101	0	39	226	60	0	110	287	15
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	23	146	84	0	124	149	112	0	43	251	67	0	122	318	17
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		253			385			361			457	
Entry Volume veh/h		248			377			354			448	
Circulating Flow (v_c), pc/h	564			317			291			316		
Exiting Flow (v_{ex}), pc/h	335			209			386			526		
Capacity (c_{pce}), pc/h		643			823			845			824	
Capacity (c), veh/h		630			807			828			808	
v/c Ratio (x)		0.39			0.47			0.43			0.55	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		11.3			10.7			9.7			12.6	
Lane LOS		B			B			A			B	
95% Queue, veh		1.9			2.5			2.2			3.5	
Approach Delay, s/veh	11.3			10.7			9.7			12.6		
Approach LOS	B			B			A			B		
Intersection Delay, s/veh | LOS	11.2						B					

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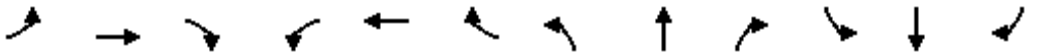

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	324	0	16	417	79	8	8	34	243	13	44
Future Volume (vph)	11	324	0	16	417	79	8	8	34	243	13	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3539		1755	3446			3121			1777	1527
Flt Permitted	0.34	1.00		0.53	1.00			0.92			0.69	1.00
Satd. Flow (perm)	635	3539		979	3446			2886			1293	1527
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	352	0	17	453	86	9	9	37	264	14	48
RTOR Reduction (vph)	0	0	0	0	38	0	0	15	0	0	0	20
Lane Group Flow (vph)	12	352	0	17	501	0	0	40	0	0	278	28
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	13.4	13.4		13.4	13.4			32.1			32.1	32.1
Effective Green, g (s)	13.4	13.4		13.4	13.4			32.1			32.1	32.1
Actuated g/C Ratio	0.24	0.24		0.24	0.24			0.58			0.58	0.58
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	154	862		238	839			1684			754	891
v/s Ratio Prot		0.10			c0.15							
v/s Ratio Perm	0.02			0.02				0.01			c0.22	0.02
v/c Ratio	0.08	0.41		0.07	0.60			0.02			0.37	0.03
Uniform Delay, d1	16.0	17.5		16.0	18.4			4.8			6.1	4.9
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.2	0.3		0.1	1.2			0.0			1.4	0.1
Delay (s)	16.3	17.8		16.1	19.6			4.9			7.5	4.9
Level of Service	B	B		B	B			A			A	A
Approach Delay (s)		17.7			19.5			4.9			7.1	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Morse Street
Agency or Co.	IBI Group	E/W Street Name	Morse Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	24	13	17	0	31	8	114	0	3	378	61	0	95	511	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	27	14	19	0	34	9	126	0	3	419	68	0	105	567	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		60			169			490			691	
Entry Volume veh/h		59			166			480			677	
Circulating Flow (v_c), pc/h	706			449			146			46		
Exiting Flow (v_{ex}), pc/h	187			31			572			620		
Capacity (c_{pce}), pc/h		558			721			977			1079	
Capacity (c), veh/h		547			707			957			1058	
v/c Ratio (x)		0.11			0.23			0.50			0.64	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.9			7.8			10.0			12.4	
Lane LOS		A			A			A			B	
95% Queue, veh		0.4			0.9			2.9			4.8	
Approach Delay, s/veh	7.9			7.8			10.0			12.4		
Approach LOS	A			A			A			B		
Intersection Delay, s/veh | LOS	10.8						B					

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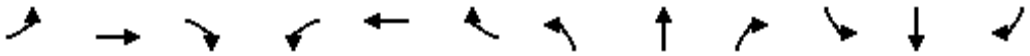


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	144	24	38	125	0	21	0	31	0	0	0
Future Volume (Veh/h)	0	144	24	38	125	0	21	0	31	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	157	26	41	136	0	23	0	34	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	136			183			388	388	170	422	401	136
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	136			183			388	388	170	422	401	136
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			96	100	96	100	100	100
cM capacity (veh/h)	1448			1392			558	531	874	509	522	913

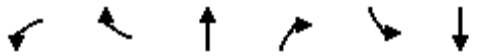
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	183	177	57	0
Volume Left	0	41	23	0
Volume Right	26	0	34	0
cSH	1448	1392	711	1700
Volume to Capacity	0.00	0.03	0.08	0.00
Queue Length 95th (ft)	0	2	7	0
Control Delay (s)	0.0	2.0	10.5	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	2.0	10.5	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	31.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	63	15	4	45	1	26	0	11	1	0	1
Future Volume (Veh/h)	1	63	15	4	45	1	26	0	11	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	68	16	4	49	1	28	0	12	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	50			84			136	136	76	148	144	50
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	50			84			136	136	76	148	144	50
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	100	99	100	100	100
cM capacity (veh/h)	1557			1513			832	752	985	809	745	1019

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	85	54	40	2
Volume Left	1	4	28	1
Volume Right	16	1	12	1
cSH	1557	1513	872	902
Volume to Capacity	0.00	0.00	0.05	0.00
Queue Length 95th (ft)	0	0	4	0
Control Delay (s)	0.1	0.6	9.3	9.0
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.6	9.3	9.0
Approach LOS			A	A

Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	14.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	37	106	15	37	132	15
Future Volume (vph)	37	106	15	37	132	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	115	16	40	143	16

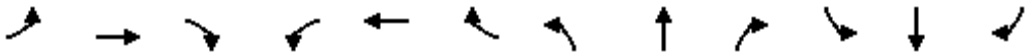
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	155	56	159
Volume Left (vph)	40	0	143
Volume Right (vph)	115	40	0
Hadj (s)	-0.36	-0.39	0.21
Departure Headway (s)	4.0	4.0	4.5
Degree Utilization, x	0.17	0.06	0.20
Capacity (veh/h)	850	847	763
Control Delay (s)	7.9	7.3	8.6
Approach Delay (s)	7.9	7.3	8.6
Approach LOS	A	A	A

Intersection Summary			
Delay	8.1		
Level of Service	A		
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	118	91	15	79	3	69	9	15	13	10	5
Future Volume (Veh/h)	3	118	91	15	79	3	69	9	15	13	10	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	128	99	16	86	3	75	10	16	14	11	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	89			227			314	304	178	324	352	88
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			227			314	304	178	324	352	88
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			88	98	98	98	98	99
cM capacity (veh/h)	1506			1341			620	600	866	603	564	971

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	230	105	101	30
Volume Left	3	16	75	14
Volume Right	99	3	16	5
cSH	1506	1341	647	627
Volume to Capacity	0.00	0.01	0.16	0.05
Queue Length 95th (ft)	0	1	14	4
Control Delay (s)	0.1	1.3	11.6	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	1.3	11.6	11.0
Approach LOS			B	B

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	28.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	139	9	6	86	2	2	2	17	1	3	1
Future Volume (Veh/h)	0	139	9	6	86	2	2	2	17	1	3	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	151	10	7	93	2	2	2	18	1	3	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	95			161			266	265	156	283	269	94
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	95			161			266	265	156	283	269	94
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	100	100	100
cM capacity (veh/h)	1499			1418			680	637	890	652	634	963

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	161	102	22	5
Volume Left	0	7	2	1
Volume Right	10	2	18	1
cSH	1499	1418	836	685
Volume to Capacity	0.00	0.00	0.03	0.01
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	0.6	9.4	10.3
Lane LOS		A	A	B
Approach Delay (s)	0.0	0.6	9.4	10.3
Approach LOS			A	B

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	19.6%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Cassidy Street
Agency or Co.	IBI Group	E/W Street Name	Cassidy Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	64	89	55	0	74	41	23	0	69	316	43	0	54	346	13
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	71	99	61	0	82	45	26	0	76	350	48	0	60	384	14
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			4.9763	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		231			153			474			458	
Entry Volume veh/h		226			150			465			449	
Circulating Flow (v_c), pc/h		526			497			230			203	
Exiting Flow (v_{ex}), pc/h		207			135			447			527	
Capacity (c_{pce}), pc/h		668			687			898			1122	
Capacity (c), veh/h		655			674			880			1100	
v/c Ratio (x)		0.35			0.22			0.53			0.41	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		10.1			8.0			11.2			7.6	
Lane LOS		B			A			B			A	
95% Queue, veh		1.5			0.8			3.2			2.0	
Approach Delay, s/veh	10.1			8.0			11.2			7.6		
Approach LOS	B			A			B			A		
Intersection Delay, s/veh | LOS	9.4						A					

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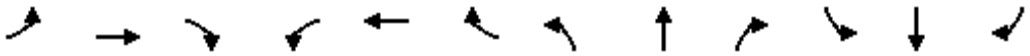
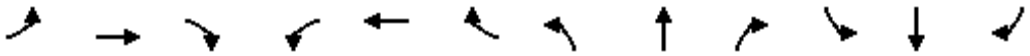


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	116	28	33	66	13	11	27	28	10	23	19
Future Volume (Veh/h)	16	116	28	33	66	13	11	27	28	10	23	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	126	30	36	72	14	12	29	30	11	25	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	86			156			360	333	141	370	341	79
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	86			156			360	333	141	370	341	79
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			98	95	97	98	96	98
cM capacity (veh/h)	1510			1424			548	566	907	530	560	981

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	173	122	71	57
Volume Left	17	36	12	11
Volume Right	30	14	30	21
cSH	1510	1424	668	657
Volume to Capacity	0.01	0.03	0.11	0.09
Queue Length 95th (ft)	1	2	9	7
Control Delay (s)	0.8	2.4	11.0	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.8	2.4	11.0	11.0
Approach LOS			B	B

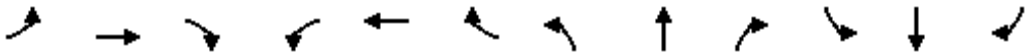
Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	24.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	62	14	8	38	2	11	22	19	11	11	7
Future Volume (vph)	5	62	14	8	38	2	11	22	19	11	11	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	67	15	9	41	2	12	24	21	12	12	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	87	52	57	32
Volume Left (vph)	5	9	12	12
Volume Right (vph)	15	2	21	8
Hadj (s)	-0.06	0.05	-0.14	-0.04
Departure Headway (s)	4.1	4.2	4.1	4.2
Degree Utilization, x	0.10	0.06	0.06	0.04
Capacity (veh/h)	856	828	842	819
Control Delay (s)	7.5	7.5	7.4	7.4
Approach Delay (s)	7.5	7.5	7.4	7.4
Approach LOS	A	A	A	A

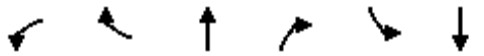
Intersection Summary				
Delay	7.5			
Level of Service	A			
Intersection Capacity Utilization	14.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	108	4	26	49	15	4	45	108	114	8	5
Future Volume (vph)	5	108	4	26	49	15	4	45	108	114	8	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	117	4	28	53	16	4	49	117	124	9	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	126	97	170	138
Volume Left (vph)	5	28	4	124
Volume Right (vph)	4	16	117	5
Hadj (s)	0.02	-0.01	-0.37	0.19
Departure Headway (s)	4.8	4.8	4.3	4.8
Degree Utilization, x	0.17	0.13	0.20	0.19
Capacity (veh/h)	698	694	796	698
Control Delay (s)	8.7	8.5	8.3	8.9
Approach Delay (s)	8.7	8.5	8.3	8.9
Approach LOS	A	A	A	A

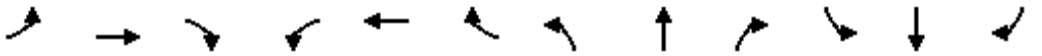
Intersection Summary				
Delay	8.6			
Level of Service	A			
Intersection Capacity Utilization	37.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	51	33	13	59	67
Future Volume (vph)	0	51	33	13	59	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	55	36	14	64	73

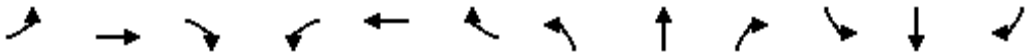
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	55	50	137
Volume Left (vph)	0	0	64
Volume Right (vph)	55	14	0
Hadj (s)	-0.57	-0.13	0.13
Departure Headway (s)	3.7	4.0	4.2
Degree Utilization, x	0.06	0.06	0.16
Capacity (veh/h)	914	869	845
Control Delay (s)	7.0	7.2	8.0
Approach Delay (s)	7.0	7.2	8.0
Approach LOS	A	A	A

Intersection Summary			
Delay	7.6		
Level of Service	A		
Intersection Capacity Utilization	16.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	121	40	256	49	216	29	213	122	183	300	6
Future Volume (vph)	15	121	40	256	49	216	29	213	122	183	300	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.95		1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1555		1788	1794	1770	3743		2006	3998	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1555		1788	1794	1770	3743		2006	3998	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	132	43	278	53	235	32	232	133	199	326	7
RTOR Reduction (vph)	0	0	39	0	0	156	0	94	0	0	2	0
Lane Group Flow (vph)	16	132	4	0	331	79	32	271	0	199	331	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	6.7	6.7	6.7		16.5	23.3	1.4	20.6		6.8	26.0	
Effective Green, g (s)	6.7	6.7	6.7		16.5	23.3	1.4	20.6		6.8	26.0	
Actuated g/C Ratio	0.10	0.10	0.10		0.24	0.33	0.02	0.30		0.10	0.37	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	192	179	149		423	599	35	1106		195	1491	
v/s Ratio Prot	0.01	c0.07			c0.19	0.04	0.02	0.07		c0.10	c0.08	
v/s Ratio Perm			0.00									
v/c Ratio	0.08	0.74	0.03		0.78	0.13	0.91	0.25		1.02	0.22	
Uniform Delay, d1	28.7	30.6	28.5		24.9	16.2	34.1	18.6		31.5	14.9	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	12.7	0.0		9.1	0.1	115.3	0.5		69.9	0.3	
Delay (s)	28.8	43.4	28.6		34.0	16.3	149.4	19.2		101.3	15.3	
Level of Service	C	D	C		C	B	F	B		F	B	
Approach Delay (s)		38.8			26.7			29.7			47.5	
Approach LOS		D			C			C			D	

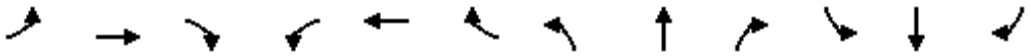
Intersection Summary			
HCM 2000 Control Delay	35.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	69.7	Sum of lost time (s)	19.1
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	434	5	16	646	50	0	0	27	28	0	30
Future Volume (Veh/h)	8	434	5	16	646	50	0	0	27	28	0	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	472	5	17	702	54	0	0	29	30	0	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	756			477			1288	1282	474	1284	1258	729
vC1, stage 1 conf vol							492	492		763	763	
vC2, stage 2 conf vol							796	790		522	495	
vCu, unblocked vol	756			412			1275	1269	409	1271	1243	729
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			100	100	95	91	100	92
cM capacity (veh/h)	855			1078			300	336	604	323	345	423

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	486	773	29	63
Volume Left	9	17	0	30
Volume Right	5	54	29	33
cSH	855	1078	604	368
Volume to Capacity	0.01	0.02	0.05	0.17
Queue Length 95th (ft)	1	1	4	15
Control Delay (s)	0.3	0.4	11.3	16.8
Lane LOS	A	A	B	C
Approach Delay (s)	0.3	0.4	11.3	16.8
Approach LOS			B	C

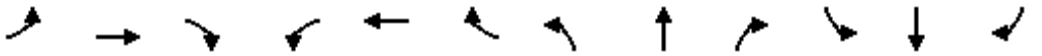
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	62.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	539	12	36	848	28	12	5	78	33	5	17
Future Volume (Veh/h)	11	539	12	36	848	28	12	5	78	33	5	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	586	13	39	922	30	13	5	85	36	5	18
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.98			0.98	0.98	0.98	0.98	0.98	
vC, conflicting volume	952			600			1639	1648	594	1712	1639	938
vC1, stage 1 conf vol							618	618		1015	1015	
vC2, stage 2 conf vol							1022	1030		698	624	
vCu, unblocked vol	952			583			1642	1650	577	1716	1642	938
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			96			94	98	83	83	98	94
cM capacity (veh/h)	722			972			217	251	507	207	256	320

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	12	599	39	952	103	59
Volume Left	12	0	39	0	13	36
Volume Right	0	13	0	30	85	18
cSH	722	1700	972	1700	416	237
Volume to Capacity	0.02	0.35	0.04	0.56	0.25	0.25
Queue Length 95th (ft)	1	0	3	0	24	24
Control Delay (s)	10.1	0.0	8.9	0.0	16.5	25.2
Lane LOS	B		A		C	D
Approach Delay (s)	0.2		0.3		16.5	25.2
Approach LOS					C	D

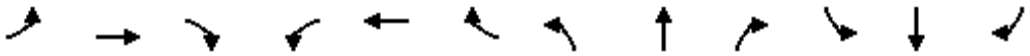
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	62.8%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	773	0	0	998	147	0	0	0	0	0	24
Future Volume (Veh/h)	31	773	0	0	998	147	0	0	0	0	0	24
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	840	0	0	1085	160	0	0	0	0	0	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1245			840			2019	2153	840	2073	2073	1165
vC1, stage 1 conf vol							908	908		1165	1165	
vC2, stage 2 conf vol							1111	1245		908	908	
vCu, unblocked vol	1245			840			2019	2153	840	2073	2073	1165
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			100			100	100	100	100	100	89
cM capacity (veh/h)	559			795			161	178	365	185	208	236

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	34	840	0	1245	0	26
Volume Left	34	0	0	0	0	0
Volume Right	0	0	0	160	0	26
cSH	559	1700	1700	1700	1700	236
Volume to Capacity	0.06	0.49	0.00	0.73	0.00	0.11
Queue Length 95th (ft)	5	0	0	0	0	9
Control Delay (s)	11.9	0.0	0.0	0.0	0.0	22.1
Lane LOS	B				A	C
Approach Delay (s)	0.5		0.0		0.0	22.1
Approach LOS					A	C

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	71.4%	ICU Level of Service		C
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	82	0	0	70	35	306	28	50	692	12
Future Volume (Veh/h)	0	0	82	0	0	70	35	306	28	50	692	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	89	0	0	76	38	333	30	54	752	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1185	1306	758	1373	1297	182	765			363		
vC1, stage 1 conf vol	866	866		424	424							
vC2, stage 2 conf vol	318	439		949	873							
vCu, unblocked vol	1185	1306	758	1373	1297	182	765			363		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	75	100	100	91	95			95		
cM capacity (veh/h)	272	307	349	155	287	830	844			1192		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	89	76	38	222	141	54	765
Volume Left	0	0	38	0	0	54	0
Volume Right	89	76	0	0	30	0	13
cSH	349	830	844	1700	1700	1192	1700
Volume to Capacity	0.25	0.09	0.05	0.13	0.08	0.05	0.45
Queue Length 95th (ft)	25	8	4	0	0	4	0
Control Delay (s)	18.8	9.8	9.5	0.0	0.0	8.2	0.0
Lane LOS	C	A	A			A	
Approach Delay (s)	18.8	9.8	0.9			0.5	
Approach LOS	C	A					

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	48.9%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Michigan Avenue
Agency or Co.	IBI Group	E/W Street Name	Michigan Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	84	13	36	0	45	15	8	0	22	234	6	0	6	230	27
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	93	14	40	0	50	17	9	0	24	259	7	0	7	255	30
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		147			76			290			292	
Entry Volume veh/h		144			75			284			286	
Circulating Flow (v_c), pc/h	312			376			114			91		
Exiting Flow (v_{ex}), pc/h	28			71			361			345		
Capacity (c_{pce}), pc/h		827			776			1008			1032	
Capacity (c), veh/h		811			761			988			1011	
v/c Ratio (x)		0.18			0.10			0.29			0.28	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.3			5.7			6.5			6.4	
Lane LOS		A			A			A			A	
95% Queue, veh		0.6			0.3			1.2			1.2	
Approach Delay, s/veh	6.3			5.7			6.5			6.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.4						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - West
Agency or Co.	IBI Group	E/W Street Name	West Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	16	9	18	0	20	9	18	0	18	132	20	0	18	132	16
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	18	10	20	0	22	10	20	0	20	146	22	0	20	146	18
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		48			52			188			184	
Entry Volume veh/h		47			51			184			180	
Circulating Flow (v_c), pc/h	188			184			48			52		
Exiting Flow (v_{ex}), pc/h	52			48			184			188		
Capacity (c_{pce}), pc/h		936			940			1077			1073	
Capacity (c), veh/h		918			922			1056			1052	
v/c Ratio (x)		0.05			0.06			0.17			0.17	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.4			4.4			5.0			5.0	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.2			0.6			0.6	
Approach Delay, s/veh	4.4			4.4			5.0			5.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	4.9						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Kelly
Agency or Co.	IBI Group	E/W Street Name	Kelly Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	21	13	0	15	12	96	0	5	154	14	0	88	146	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	16	23	14	0	17	13	106	0	6	171	16	0	98	162	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		53			136			193			293	
Entry Volume veh/h		52			133			189			287	
Circulating Flow (v_c), pc/h	277			193			137			36		
Exiting Flow (v_{ex}), pc/h	137			52			293			193		
Capacity (c_{pce}), pc/h		857			932			985			1090	
Capacity (c), veh/h		840			913			966			1069	
v/c Ratio (x)		0.06			0.15			0.20			0.27	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.9			5.3			5.6			5.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.5			0.7			1.1	
Approach Delay, s/veh	4.9			5.3			5.6			5.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.6						A					

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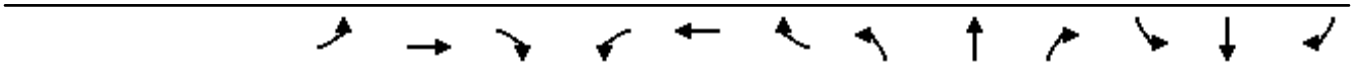


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Future Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				168	0	0	8	72	0	24	801	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				1328	0	593	148	1692	527	148	1178	527
Arrive On Green				0.36	0.00	0.00	0.08	0.32	0.00	0.08	0.32	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				168	0	0	8	72	0	24	801	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Cycle Q Clear(g_c), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				1328	0	593	148	1692	527	148	1178	527
V/C Ratio(X)				0.13	0.00	0.00	0.05	0.04	0.00	0.16	0.68	0.00
Avail Cap(c_a), veh/h				1328	0	593	148	1692	527	148	1178	527
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				10.7	0.0	0.0	21.3	11.7	0.0	21.4	14.8	0.0
Incr Delay (d2), s/veh				0.2	0.0	0.0	0.7	0.0	0.0	2.4	3.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	0.0	0.1	0.2	0.0	0.4	5.3	0.0
LnGrp Delay(d),s/veh				10.9	0.0	0.0	21.9	11.8	0.0	23.8	18.0	0.0
LnGrp LOS				B			C	B		C	B	
Approach Vol, veh/h					168			80			825	
Approach Delay, s/veh					10.9			12.8			18.1	
Approach LOS					B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	20.0			8.0	20.0		22.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	16.0			4.0	16.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	2.5			2.2	11.5		3.5
Green Ext Time (p_c), s	0.0	0.2			0.0	2.2		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	16.6
HCM 2010 LOS	B

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	531	188	479	1082	0	0
Future Volume (veh/h)	531	188	479	1082	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	577	204	521	1176		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1840	823	1074	3313		
Arrive On Green	0.50	0.50	0.30	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	577	204	521	1176		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	3.7	2.8	4.8	1.9		
Cycle Q Clear(g_c), s	3.7	2.8	4.8	1.9		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1840	823	1074	3313		
V/C Ratio(X)	0.31	0.25	0.49	0.35		
Avail Cap(c_a), veh/h	1840	823	1074	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.9	5.7	11.5	0.3		
Incr Delay (d2), s/veh	0.4	0.7	1.6	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.0	1.4	2.5	1.0		
LnGrp Delay(d),s/veh	6.4	6.4	13.0	0.6		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	781			1697		
Approach Delay, s/veh	6.4			4.4		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			16.0	24.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			12.0	20.0				36.0
Max Q Clear Time (g_c+I1), s			6.8	5.7				3.9
Green Ext Time (p_c), s			1.0	4.0				10.8

Intersection Summary	
HCM 2010 Ctrl Delay	5.0
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	640	67	807	1970	67	1
Future Volume (veh/h)	640	67	807	1970	67	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	696	73	877	2141	73	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	982	439	954	2208	492	439
Arrive On Green	0.27	0.27	0.27	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	696	73	877	2141	73	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	10.3	2.0	14.3	33.4	1.8	0.0
Cycle Q Clear(g_c), s	10.3	2.0	14.3	33.4	1.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	982	439	954	2208	492	439
V/C Ratio(X)	0.71	0.17	0.92	0.97	0.15	0.00
Avail Cap(c_a), veh/h	982	439	954	2208	492	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.9	16.9	21.4	11.5	16.8	0.0
Incr Delay (d2), s/veh	4.3	0.8	15.1	13.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	1.0	8.9	20.4	1.0	0.0
LnGrp Delay(d),s/veh	24.2	17.7	36.5	24.7	17.4	0.0
LnGrp LOS	C	B	D	C	B	
Approach Vol, veh/h	769			3018	73	
Approach Delay, s/veh	23.6			28.1	17.4	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		3.8	16.3	12.3				35.4
Green Ext Time (p_c), s		0.1	0.0	1.7				0.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.0
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Future Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	312	3	100	542	0	11	0	121	24	34	35
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1149	11	284	1982	887	0	0	0	568	596	507
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3832	36	1845	3681	1647		0		1845	1937	1647
Grp Volume(v), veh/h	0	154	161	100	542	0		0.0		24	34	35
Grp Sat Flow(s),veh/h/ln	0	1840	1931	1845	1840	1647				1845	1937	1647
Q Serve(g_s), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Cycle Q Clear(g_c), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	566	594	284	1982	887				568	596	507
V/C Ratio(X)	0.00	0.27	0.27	0.35	0.27	0.00				0.04	0.06	0.07
Avail Cap(c_a), veh/h	0	566	594	284	1982	887				568	596	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.6	13.6	19.7	6.5	0.0				12.6	12.7	12.7
Incr Delay (d2), s/veh	0.0	1.2	1.1	3.4	0.3	0.0				0.1	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	1.9	1.5	2.1	0.0				0.3	0.4	0.4
LnGrp Delay(d),s/veh	0.0	14.8	14.7	23.1	6.8	0.0				12.8	12.9	13.0
LnGrp LOS		B	B	C	A					B	B	B
Approach Vol, veh/h		315			642						93	
Approach Delay, s/veh		14.7			9.4						12.9	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			4.5	5.3		2.8		6.1
Green Ext Time (p_c), s			0.1	1.3		0.2		3.7

Intersection Summary	
HCM 2010 Ctrl Delay	11.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Future Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	250	505	5	10	665	386	11	11	21	107	62	62
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	158	960	10	105	841	376	216	216	376	422	203	203
Arrive On Green	0.09	0.26	0.26	0.02	0.08	0.08	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3734	37	1845	3681	1647	945	945	1647	1845	890	890
Grp Volume(v), veh/h	250	249	261	10	665	386	22	0	21	107	0	124
Grp Sat Flow(s),veh/h/ln	1845	1840	1931	1845	1840	1647	1890	0	1647	1845	0	1780
Q Serve(g_s), s	6.0	8.1	8.1	0.4	12.4	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Cycle Q Clear(g_c), s	6.0	8.1	8.1	0.4	12.4	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Prop In Lane	1.00		0.02	1.00		1.00	0.50		1.00	1.00		0.50
Lane Grp Cap(c), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
V/C Ratio(X)	1.58	0.53	0.53	0.09	0.79	1.03	0.05	0.00	0.06	0.25	0.00	0.30
Avail Cap(c_a), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.0	22.3	22.3	32.6	30.7	32.4	21.1	0.0	21.1	22.1	0.0	22.4
Incr Delay (d2), s/veh	289.4	4.1	4.0	1.8	7.5	53.1	0.2	0.0	0.3	1.4	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.7	4.6	4.8	0.2	7.2	12.8	0.4	0.0	0.3	1.9	0.0	2.2
LnGrp Delay(d),s/veh	321.4	26.5	26.3	34.3	38.2	85.4	21.3	0.0	21.4	23.6	0.0	24.3
LnGrp LOS	F	C	C	C	D	F	C		C	C		C
Approach Vol, veh/h		760			1061			43			231	
Approach Delay, s/veh		123.4			55.3			21.3			24.0	
Approach LOS		F			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	10.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.7	2.4	10.1		6.0	8.0	18.0
Green Ext Time (p_c), s		0.1	0.0	1.9		0.7	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	75.9
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	492	362	132	894	400	422	443	376	422	443	376
Arrive On Green	0.02	0.08	0.08	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	2026	1489	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	388	355	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1674	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.1	14.6	14.7	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.1	14.6	14.7	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		0.89	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.87	0.87	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	31.1	31.1	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	19.8	22.1	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	9.9	9.3	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	53.4	50.8	53.2	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	D	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		52.1			43.4			27.3			30.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	16.7		11.8	5.1	17.8
Green Ext Time (p_c), s		1.3	0.0	0.2		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	40.0
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Future Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	93	8	17	71	42	2	5	7	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.8	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	15%	21%	13%
Vol Thru, %	38%	73%	54%
Vol Right, %	46%	6%	33%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	13	118	120
LT Vol	2	25	16
Through Vol	5	86	65
RT Vol	6	7	39
Lane Flow Rate	14	128	130
Geometry Grp	1	1	1
Degree of Util (X)	0.017	0.145	0.141
Departure Headway (Hd)	4.232	4.064	3.887
Convergence, Y/N	Yes	Yes	Yes
Cap	851	881	920
Service Time	2.232	2.093	1.921
HCM Lane V/C Ratio	0.016	0.145	0.141
HCM Control Delay	7.3	7.8	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.5

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Future Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	161	75	54	64	0	0	0	0	18	0	60

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	161	0	0			333	333	64
Stage 1	-	-	-	-	-	-			172	172	-
Stage 2	-	-	-	-	-	-			161	161	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1418	-	0			662	587	1000
Stage 1	0	-	-	-	-	0			858	756	-
Stage 2	0	-	-	-	-	0			868	765	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1418	-	-			636	0	1000
Mov Cap-2 Maneuver	-	-	-	-	-	-			636	0	-
Stage 1	-	-	-	-	-	-			825	0	-
Stage 2	-	-	-	-	-	-			868	0	-

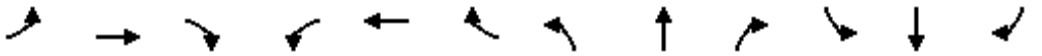
Approach	EB	WB	SB
HCM Control Delay, s	0	3.5	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1418	-	636	1000
HCM Lane V/C Ratio	-	-	0.038	-	0.029	0.06
HCM Control Delay (s)	-	-	7.6	0	10.8	8.8
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	518	201	1018	1229	17	967
Future Volume (veh/h)	518	201	1018	1229	17	967
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	563	0	1107	1336	18	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	883	395	1384	1317	394	618
Arrive On Green	0.24	0.00	0.39	0.68	0.21	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	563	0	1107	1336	18	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	10.3	0.0	20.6	51.0	0.6	0.0
Cycle Q Clear(g_c), s	10.3	0.0	20.6	51.0	0.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	883	395	1384	1317	394	618
V/C Ratio(X)	0.64	0.00	0.80	1.01	0.05	0.00
Avail Cap(c_a), veh/h	883	395	1384	1317	394	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.6	0.0	20.4	12.0	23.4	0.0
Incr Delay (d2), s/veh	3.5	0.0	4.9	28.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	11.1	36.7	0.3	0.0
LnGrp Delay(d),s/veh	29.1	0.0	25.4	40.4	23.7	0.0
LnGrp LOS	C		C	F	C	
Approach Vol, veh/h	563			2443	18	
Approach Delay, s/veh	29.1			33.6	23.7	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	33.0	22.0				55.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	29.0	18.0				51.0
Max Q Clear Time (g_c+I1), s		2.6	22.6	12.3				53.0
Green Ext Time (p_c), s		0.0	2.6	1.8				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	32.7
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	107	194	477	307	1656	215	37	179	119	73	77
Future Volume (vph)	270	107	194	477	307	1656	215	37	179	119	73	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3019	1441		1786	1583		1807	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3019	1441		1786	1583		1807	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	116	211	518	334	1800	234	40	195	129	79	84
RTOR Reduction (vph)	0	0	190	0	491	503	0	0	117	0	0	70
Lane Group Flow (vph)	293	116	21	518	743	397	0	274	78	0	208	14
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	16.9	9.8	9.8	33.7	28.2	28.2		21.2	21.2		17.0	17.0
Effective Green, g (s)	16.9	9.8	9.8	33.7	28.2	28.2		21.2	21.2		17.0	17.0
Actuated g/C Ratio	0.17	0.10	0.10	0.34	0.28	0.28		0.21	0.21		0.17	0.17
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	299	182	155	596	851	406		378	335		307	269
v/s Ratio Prot	0.17	0.06		c0.29	0.25			c0.15			c0.12	
v/s Ratio Perm			0.01			c0.28			0.05			0.01
v/c Ratio	0.98	0.64	0.13	0.87	0.98dr	0.98		0.72	0.23		0.68	0.05
Uniform Delay, d1	41.4	43.4	41.2	31.1	34.2	35.6		36.7	32.7		38.9	34.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	46.0	5.3	0.1	12.8	9.5	38.5		11.5	1.6		11.4	0.4
Delay (s)	87.3	48.7	41.4	43.9	43.7	74.1		48.2	34.3		50.3	35.1
Level of Service	F	D	D	D	D	E		D	C		D	D
Approach Delay (s)		64.5			54.1			42.4			46.0	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	53.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.3
Intersection Capacity Utilization	108.1%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	661	0	327	0	0	443	674	0	563	568	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	0	0	0	0	733	0	355	0	0	491	747	0	624	630	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929		4.6453	4.3276			4.3276		4.6453	4.3276	
Follow-Up Headway (s)		3.1858		2.6667	2.5352			2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		0		0	733	355		491	747	624	630	
Entry Volume veh/h		0		0	719	355		481	732	612	618	
Circulating Flow (v_c), pc/h	1987			491			624			733		
Exiting Flow (v_{ex}), pc/h	624			0			491			1363		
Capacity (c_{pce}), pc/h		155		859	935			835		688	762	
Capacity (c), veh/h		152		842	917			819		674	747	
v/c Ratio (x)		0.00		0.00	0.78			0.59		0.91	0.83	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.7		4.3	20.4	0.0		13.4	0.0	40.1	27.6	
Lane LOS		C		A	C	A		B	A	E	D	
95% Queue, veh		0.0		0.0	8.2			3.9		11.7	9.2	
Approach Delay, s/veh				13.7			5.3			33.8		
Approach LOS				B			A			D		
Intersection Delay, s/veh | LOS	17.8						C					

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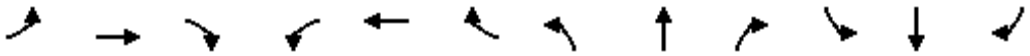

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	21	11	92	36	158	18	105	97	182	142	12
Future Volume (vph)	0	21	11	92	36	158	18	105	97	182	142	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	12	100	39	172	20	114	105	198	154	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	35	311	239	365
Volume Left (vph)	0	100	20	198
Volume Right (vph)	12	172	105	13
Hadj (s)	-0.17	-0.23	-0.21	0.12
Departure Headway (s)	6.0	5.3	5.3	5.4
Degree Utilization, x	0.06	0.46	0.35	0.55
Capacity (veh/h)	491	625	628	637
Control Delay (s)	9.3	12.8	11.0	14.6
Approach Delay (s)	9.3	12.8	11.0	14.6
Approach LOS	A	B	B	B

Intersection Summary				
Delay	12.9			
Level of Service	B			
Intersection Capacity Utilization	64.1%	ICU Level of Service	C	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Surfrider Way
E/W Street Name	Surfrider Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1
Lane Assignment			LTR				LTR				LTR		LT		R	
Volume (V), veh/h	0	245	81	102	0	17	71	43	0	72	721	27	0	69	729	177
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	272	90	113	0	19	79	48	0	80	799	30	0	76	808	196
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929		4.5436	4.5436	
Follow-Up Headway (s)		3.1858			3.1858			3.1858		2.5352	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		475			146			909		884	196	
Entry Volume veh/h		466			143			891		867	192	
Circulating Flow (v_c), pc/h	903			1151			438			178		
Exiting Flow (v_{ex}), pc/h	196			355			1119			940		
Capacity (c_{pce}), pc/h		458			357			729		1208	1208	
Capacity (c), veh/h		449			350			715		1184	1184	
v/c Ratio (x)		1.04			0.41			1.25		0.73	0.16	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		83.1			19.2			142.3		14.5	4.4	
Lane LOS		F			C			F		B	A	
95% Queue, veh		14.3			1.9			32.4		7.0	0.6	
Approach Delay, s/veh	83.1			19.2			142.3			12.7		
Approach LOS	F			C			F			B		
Intersection Delay, s/veh | LOS	71.0						F					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Civic Center Drive
Agency or Co.	IBI Group	E/W Street Name	Civic Center Drive
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	36	38	32	0	36	45	76	0	27	730	65	0	42	762	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	40	42	35	0	40	50	84	0	30	809	72	0	47	845	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		117			174			911			925	
Entry Volume veh/h		115			171			893			907	
Circulating Flow (v_c), pc/h	932			879			129			120		
Exiting Flow (v_{ex}), pc/h	161			113			933			920		
Capacity (c_{pce}), pc/h		445			469			993			1002	
Capacity (c), veh/h		436			460			974			983	
v/c Ratio (x)		0.26			0.37			0.92			0.92	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.5			14.2			32.9			33.6	
Lane LOS		B			B			D			D	
95% Queue, veh		1.0			1.7			13.9			14.3	
Approach Delay, s/veh	12.5			14.2			32.9			33.6		
Approach LOS	B			B			D			D		
Intersection Delay, s/veh | LOS	30.6						D					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Pier View Way
Agency or Co.	IBI Group	E/W Street Name	Pier View Way
Date Performed	7/11/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	72	27	79	0	4	27	10	0	60	810	9	0	5	810	136
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	80	30	88	0	4	30	11	0	67	898	10	0	6	898	151
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		198			45			975			1055	
Entry Volume veh/h		194			44			956			1034	
Circulating Flow (v_c), pc/h		908			1045			116			101	
Exiting Flow (v_{ex}), pc/h		46			248			989			990	
Capacity (c_{pce}), pc/h		456			397			1006			1021	
Capacity (c), veh/h		447			390			987			1001	
v/c Ratio (x)		0.43			0.11			0.97			1.03	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		16.3			11.0			42.0			57.5	
Lane LOS		C			B			E			F	
95% Queue, veh		2.2			0.4			17.1			21.9	
Approach Delay, s/veh	16.3			11.0			42.0			57.5		
Approach LOS	C			B			E			F		
Intersection Delay, s/veh | LOS	46.4						E					

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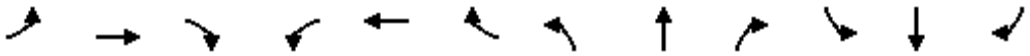


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	15	8	117	57	8	14	40	405	27	14	364	12
Future Volume (vph)	15	8	117	57	8	14	40	405	27	14	364	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	9	127	62	9	15	43	440	29	15	396	13

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	25	127	86	263	249	213	211
Volume Left (vph)	16	0	62	43	0	15	0
Volume Right (vph)	0	127	15	0	29	0	13
Hadj (s)	0.35	-0.67	0.07	0.12	-0.05	0.07	-0.01
Departure Headway (s)	7.3	6.2	7.0	6.0	5.8	6.0	5.9
Degree Utilization, x	0.05	0.22	0.17	0.44	0.40	0.36	0.35
Capacity (veh/h)	453	527	472	586	601	575	583
Control Delay (s)	9.5	9.8	11.3	12.3	11.4	11.1	10.9
Approach Delay (s)	9.7		11.3	11.9		11.0	
Approach LOS	A		B	B		B	

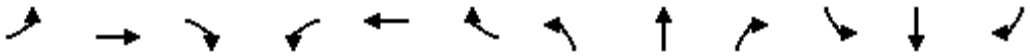
Intersection Summary				
Delay	11.3			
Level of Service	B			
Intersection Capacity Utilization	45.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	284	100	186	197	73	218
Future Volume (vph)	284	100	186	197	73	218
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	309	109	202	214	79	237

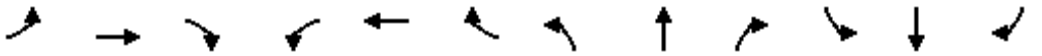
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	309	109	416	316
Volume Left (vph)	309	0	0	79
Volume Right (vph)	0	109	214	0
Hadj (s)	0.53	-0.67	-0.27	0.08
Departure Headway (s)	7.1	5.8	5.5	6.0
Degree Utilization, x	0.61	0.18	0.64	0.53
Capacity (veh/h)	489	586	626	574
Control Delay (s)	19.1	8.9	17.6	15.4
Approach Delay (s)	16.4		17.6	15.4
Approach LOS	C		C	C

Intersection Summary			
Delay	16.6		
Level of Service	C		
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	322	83	294	89	0	0	0	0	131	94
Future Volume (vph)	45	0	322	83	294	89	0	0	0	0	131	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.94	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3416						3317	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3416						3317	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	0	350	90	320	97	0	0	0	0	142	102
RTOR Reduction (vph)	0	0	307	43	34	0	0	0	0	0	88	0
Lane Group Flow (vph)	49	0	43	47	383	0	0	0	0	0	156	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	7.3		7.3	31.2	31.2						8.0	
Effective Green, g (s)	7.3		7.3	31.2	31.2						8.0	
Actuated g/C Ratio	0.12		0.12	0.52	0.52						0.13	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	215		339	920	1776						442	
v/s Ratio Prot	c0.03		0.02	0.03	c0.11						c0.05	
v/s Ratio Perm												
v/c Ratio	0.23		0.13	0.05	0.22						0.35	
Uniform Delay, d1	23.8		23.5	7.1	7.8						23.6	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.5		0.2	0.1	0.3						0.5	
Delay (s)	24.3		23.7	7.2	8.1						24.1	
Level of Service	C		C	A	A						C	
Approach Delay (s)		23.8			7.9			0.0			24.1	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	33.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	193	443	72	272	743	0	0	602	199
Future Volume (vph)	0	0	0	193	443	72	272	743	0	0	602	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1519	1770	1863			1759	1454
Flt Permitted				0.95	1.00	1.00	0.12	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1519	219	1863			1759	1454
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	210	482	78	296	808	0	0	654	216
RTOR Reduction (vph)	0	0	0	0	0	60	0	0	0	0	1	59
Lane Group Flow (vph)	0	0	0	210	482	18	296	808	0	0	675	135
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.0	18.0	18.0	48.4	48.4			29.0	29.0
Effective Green, g (s)				18.0	18.0	18.0	48.4	48.4			29.0	29.0
Actuated g/C Ratio				0.24	0.24	0.24	0.63	0.63			0.38	0.38
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				417	833	357	431	1180			667	551
v/s Ratio Prot				0.12	c0.14		0.13	c0.43			c0.38	
v/s Ratio Perm						0.01	0.31					0.09
v/c Ratio				0.50	0.58	0.05	0.69	0.68			1.01	0.25
Uniform Delay, d1				25.3	25.8	22.6	23.7	9.1			23.7	16.2
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				4.3	2.9	0.3	4.9	1.8			37.8	0.3
Delay (s)				29.6	28.8	22.9	28.6	10.9			61.5	16.5
Level of Service				C	C	C	C	B			E	B
Approach Delay (s)		0.0			28.4			15.6			51.4	
Approach LOS		A			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	30.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

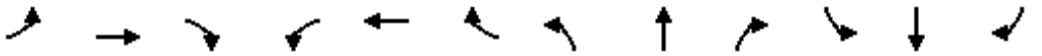
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	145	0	132	715	295	16	83	317	411	55	22
Future Volume (vph)	19	145	0	132	715	295	16	83	317	411	55	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539		1770	3539	1583		1848	1583	1681	1688	
Flt Permitted	0.26	1.00		0.65	1.00	1.00		0.94	1.00	0.69	0.73	
Satd. Flow (perm)	488	3539		1214	3539	1583		1754	1583	1217	1275	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	158	0	143	777	321	17	90	345	447	60	24
RTOR Reduction (vph)	0	0	0	0	0	206	0	0	184	0	6	0
Lane Group Flow (vph)	21	158	0	143	777	115	0	107	161	259	266	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	20.1	20.1		19.7	19.7	19.7		25.7	25.7	25.7	25.7	
Effective Green, g (s)	20.1	20.1		19.7	19.7	19.7		25.7	25.7	25.7	25.7	
Actuated g/C Ratio	0.37	0.37		0.36	0.36	0.36		0.47	0.47	0.47	0.47	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	178	1293		434	1267	567		819	739	568	595	
v/s Ratio Prot		0.04			c0.22							
v/s Ratio Perm	0.04			0.12		0.07		0.06	0.10	c0.21	0.21	
v/c Ratio	0.12	0.12		0.33	0.61	0.20		0.13	0.22	0.46	0.45	
Uniform Delay, d1	11.6	11.6		12.8	14.5	12.2		8.3	8.7	9.9	9.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.5	0.9	0.2		0.3	0.7	2.6	2.4	
Delay (s)	12.0	11.6		13.4	15.4	12.4		8.6	9.4	12.5	12.3	
Level of Service	B	B		B	B	B		A	A	B	B	
Approach Delay (s)		11.7			14.4			9.2			12.4	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	281	16	25	58	26	32
Future Volume (Veh/h)	281	16	25	58	26	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	305	17	27	63	28	35
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			322		430	314
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			322		430	314
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		95	95
cM capacity (veh/h)			1238		569	727

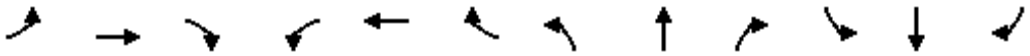
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	322	90	63
Volume Left	0	27	28
Volume Right	17	0	35
cSH	1700	1238	647
Volume to Capacity	0.19	0.02	0.10
Queue Length 95th (ft)	0	2	8
Control Delay (s)	0.0	2.5	11.2
Lane LOS		A	B
Approach Delay (s)	0.0	2.5	11.2
Approach LOS			B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	368	210	234	0	0	0	97	492	145	155	422	120
Future Volume (vph)	368	210	234	0	0	0	97	492	145	155	422	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.94				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1493				1770	1863	1552	1770	1863	1516
Flt Permitted	0.95	1.00	1.00				0.50	1.00	1.00	0.21	1.00	1.00
Satd. Flow (perm)	1770	1863	1493				929	1863	1552	383	1863	1516
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	400	228	254	0	0	0	105	535	158	168	459	130
RTOR Reduction (vph)	0	0	165	0	0	0	0	0	84	0	0	65
Lane Group Flow (vph)	400	228	89	0	0	0	105	535	74	168	459	65
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	21.0	21.0	21.0				23.0	23.0	23.0	30.2	30.2	30.2
Effective Green, g (s)	21.0	21.0	21.0				23.0	23.0	23.0	30.2	30.2	30.2
Actuated g/C Ratio	0.35	0.35	0.35				0.38	0.38	0.38	0.50	0.50	0.50
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	619	652	522				356	714	594	266	937	763
v/s Ratio Prot	c0.23	0.12						c0.29		0.03	c0.25	
v/s Ratio Perm			0.06				0.11		0.05	0.28		0.04
v/c Ratio	0.65	0.35	0.17				0.29	0.75	0.12	0.63	0.49	0.09
Uniform Delay, d1	16.4	14.4	13.5				12.9	16.0	12.0	10.5	9.8	7.7
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	1.5	0.7				2.1	7.1	0.4	4.8	1.8	0.2
Delay (s)	21.5	15.9	14.2				15.0	23.1	12.4	15.3	11.7	8.0
Level of Service	C	B	B				B	C	B	B	B	A
Approach Delay (s)		18.0			0.0			19.9			11.8	
Approach LOS		B			A			B			B	

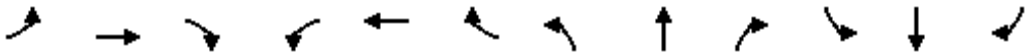
Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	530	35	0	0	0	0	10	35	30	28	0
Future Volume (Veh/h)	16	530	35	0	0	0	0	10	35	30	28	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	576	38	0	0	0	0	11	38	33	30	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			614			644	629	307	366	648	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			614			644	629	307	366	648	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	94	92	100
cM capacity (veh/h)	1622			961			334	393	689	519	384	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	305	326	49	63
Volume Left	17	0	0	33
Volume Right	0	38	38	0
cSH	1622	1700	590	444
Volume to Capacity	0.01	0.19	0.08	0.14
Queue Length 95th (ft)	1	0	7	12
Control Delay (s)	0.5	0.0	11.7	14.4
Lane LOS	A		B	B
Approach Delay (s)	0.2		11.7	14.4
Approach LOS			B	B

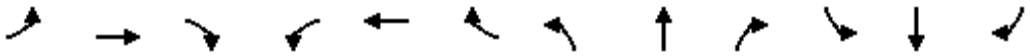
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	32.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Future Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	1248	26	0	0	0	0	14	34	61	53	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	664	650	48	114
Volume Left (vph)	40	0	0	61
Volume Right (vph)	0	26	34	0
Hadj (s)	0.06	0.01	-0.39	0.14
Departure Headway (s)	5.1	5.0	5.6	6.0
Degree Utilization, x	0.93	0.90	0.08	0.19
Capacity (veh/h)	702	714	628	586
Control Delay (s)	40.6	35.3	9.1	10.5
Approach Delay (s)	38.0		9.1	10.5
Approach LOS	E		A	B

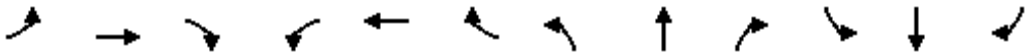
Intersection Summary				
Delay	34.9			
Level of Service	D			
Intersection Capacity Utilization	52.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	271	479	13	42	0	20	0	19	12	0	0	0
Future Volume (vph)	271	479	13	42	0	20	0	19	12	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	295	521	14	46	0	22	0	21	13	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	295	535	68	34
Volume Left (vph)	295	0	46	0
Volume Right (vph)	0	14	22	13
Hadj (s)	0.53	0.02	-0.02	-0.20
Departure Headway (s)	5.2	4.7	4.7	5.4
Degree Utilization, x	0.42	0.69	0.09	0.05
Capacity (veh/h)	690	767	737	623
Control Delay (s)	10.8	16.3	8.2	8.7
Approach Delay (s)	14.3		8.2	8.7
Approach LOS	B		A	A

Intersection Summary				
Delay	13.7			
Level of Service	B			
Intersection Capacity Utilization	42.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	38	0	0	31	17	576	45	22	527	18
Future Volume (Veh/h)	0	0	38	0	0	31	17	576	45	22	527	18
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	41	0	0	34	18	626	49	24	573	20
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked	0.87	0.87	0.83	0.87	0.87	0.92	0.83			0.92		
vC, conflicting volume	1334	1356	590	1356	1342	658	600			682		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1106	1132	399	1131	1115	587	411			613		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	93	98			97		
cM capacity (veh/h)	143	166	535	137	169	467	943			884		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	41	34	18	675	24	593
Volume Left	0	0	18	0	24	0
Volume Right	41	34	0	49	0	20
cSH	535	467	943	1700	884	1700
Volume to Capacity	0.08	0.07	0.02	0.40	0.03	0.35
Queue Length 95th (ft)	6	6	1	0	2	0
Control Delay (s)	12.3	13.3	8.9	0.0	9.2	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.3	13.3	0.2		0.4	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	43.1%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	0	71	0	45	10	13	0	46	577	20	0	25	524	61
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	16	0	79	0	50	11	14	0	51	640	22	0	28	581	68
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		95			75			713			677	
Entry Volume veh/h		93			74			699			664	
Circulating Flow (v_c), pc/h	659			707			44			112		
Exiting Flow (v_{ex}), pc/h	50			130			670			710		
Capacity (c_{pce}), pc/h		585			557			1081			1010	
Capacity (c), veh/h		573			546			1060			990	
v/c Ratio (x)		0.16			0.13			0.66			0.67	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.3			8.3			13.0			14.0	
Lane LOS		A			A			B			B	
95% Queue, veh		0.6			0.5			5.2			5.4	
Approach Delay, s/veh	8.3			8.3			13.0			14.0		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh | LOS	12.9						B					

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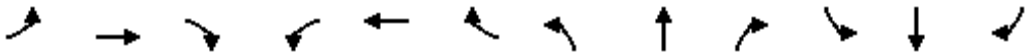
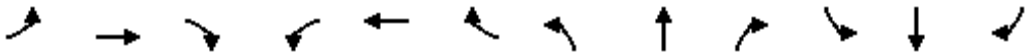


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	49	76	31	91	6	137	4	287	73	163	177	3
Future Volume (vph)	49	76	31	91	6	137	4	287	73	163	177	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	83	34	99	7	149	4	312	79	177	192	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	170	255	395	372
Volume Left (vph)	53	99	4	177
Volume Right (vph)	34	149	79	3
Hadj (s)	-0.02	-0.24	-0.08	0.12
Departure Headway (s)	7.0	6.5	6.1	6.3
Degree Utilization, x	0.33	0.46	0.67	0.65
Capacity (veh/h)	431	485	559	532
Control Delay (s)	13.3	14.9	20.4	20.4
Approach Delay (s)	13.3	14.9	20.4	20.4
Approach LOS	B	B	C	C

Intersection Summary				
Delay		18.2		
Level of Service		C		
Intersection Capacity Utilization		68.1%	ICU Level of Service	C
Analysis Period (min)		15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	334	48	21	233	38	45	70	71	30	94	15
Future Volume (Veh/h)	13	334	48	21	233	38	45	70	71	30	94	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	363	52	23	253	41	49	76	77	33	102	16
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked	0.98						0.98	0.98		0.98	0.98	0.98
vC, conflicting volume	308			422			812	778	396	866	784	288
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	280			422			795	761	396	850	766	260
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			76	76	88	82	67	98
cM capacity (veh/h)	1239			1131			208	312	650	187	309	751

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	429	317	202	151
Volume Left	14	23	49	33
Volume Right	52	41	77	16
cSH	1239	1131	338	286
Volume to Capacity	0.01	0.02	0.60	0.53
Queue Length 95th (ft)	1	2	92	72
Control Delay (s)	0.4	0.8	30.3	30.8
Lane LOS	A	A	D	D
Approach Delay (s)	0.4	0.8	30.3	30.8
Approach LOS			D	D

Intersection Summary			
Average Delay	10.2		
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	101	124	179	0	118	99	21	0	157	568	128	0	23	568	50
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	112	137	198	0	131	110	23	0	174	630	142	0	26	630	55
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		447			264			946			711	
Entry Volume veh/h		438			259			927			697	
Circulating Flow (v_c), pc/h		787			916			275			415	
Exiting Flow (v_{ex}), pc/h		305			339			765			959	
Capacity (c_{pce}), pc/h		514			452			858			746	
Capacity (c), veh/h		504			443			841			732	
v/c Ratio (x)		0.87			0.58			1.10			0.95	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		42.5			21.8			83.7			46.2	
Lane LOS		E			C			F			E	
95% Queue, veh		9.3			3.6			24.8			14.2	
Approach Delay, s/veh	42.5			21.8			83.7			46.2		
Approach LOS	E			C			F			E		
Intersection Delay, s/veh | LOS	57.8						F					

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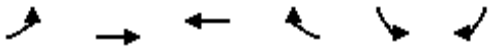
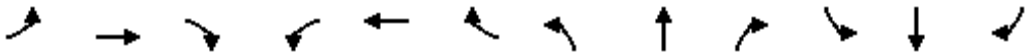


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	433	322	23	34	36
Future Volume (Veh/h)	8	433	322	23	34	36
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	471	350	25	37	39
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	383				860	372
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	383				860	372
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				88	94
cM capacity (veh/h)	1168				321	669

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	480	375	76
Volume Left	9	0	37
Volume Right	0	25	39
cSH	1168	1700	438
Volume to Capacity	0.01	0.22	0.17
Queue Length 95th (ft)	1	0	16
Control Delay (s)	0.2	0.0	14.9
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	14.9
Approach LOS			B

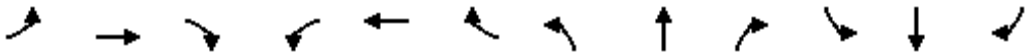
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	443	4	2	296	27	2	1	3	41	0	33
Future Volume (Veh/h)	24	443	4	2	296	27	2	1	3	41	0	33
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	482	4	2	322	29	2	1	3	45	0	36
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	353			486			914	893	484	882	880	340
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	353			486			914	893	484	882	880	340
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			99	100	99	83	100	95
cM capacity (veh/h)	1204			1077			236	274	583	259	278	700

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	512	353	6	81
Volume Left	26	2	2	45
Volume Right	4	29	3	36
cSH	1204	1077	347	360
Volume to Capacity	0.02	0.00	0.02	0.23
Queue Length 95th (ft)	2	0	1	21
Control Delay (s)	0.6	0.1	15.6	17.9
Lane LOS	A	A	C	C
Approach Delay (s)	0.6	0.1	15.6	17.9
Approach LOS			C	C

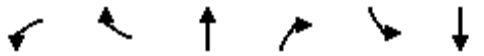
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	54.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	265	266	80	192	0	158	0	111	0	0	0
Future Volume (vph)	0	265	266	80	192	0	158	0	111	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	288	289	87	209	0	172	0	121	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	577	296	293	0
Volume Left (vph)	0	87	172	0
Volume Right (vph)	289	0	121	0
Hadj (s)	-0.27	0.09	-0.10	0.00
Departure Headway (s)	5.1	5.8	6.0	7.0
Degree Utilization, x	0.82	0.48	0.49	0.00
Capacity (veh/h)	690	589	560	444
Control Delay (s)	26.5	14.0	14.7	10.0
Approach Delay (s)	26.5	14.0	14.7	0.0
Approach LOS	D	B	B	A

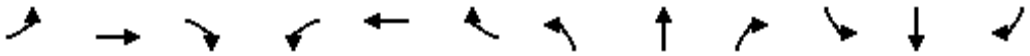
Intersection Summary				
Delay	20.4			
Level of Service	C			
Intersection Capacity Utilization	76.0%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	69	135	219	101	98	214
Future Volume (vph)	69	135	219	101	98	214
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	147	238	110	107	233

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	222	348	340
Volume Left (vph)	75	0	107
Volume Right (vph)	147	110	0
Hadj (s)	-0.30	-0.16	0.10
Departure Headway (s)	5.2	4.8	5.1
Degree Utilization, x	0.32	0.47	0.48
Capacity (veh/h)	622	715	679
Control Delay (s)	10.7	12.0	12.6
Approach Delay (s)	10.7	12.0	12.6
Approach LOS	B	B	B

Intersection Summary			
Delay	11.9		
Level of Service	B		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	358	21	20	296	77	29	46	38	84	28	23
Future Volume (Veh/h)	15	358	21	20	296	77	29	46	38	84	28	23
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	389	23	22	322	84	32	50	41	91	30	25
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.87						0.87	0.87		0.87	0.87	0.87
vC, conflicting volume	409			423			896	896	420	918	866	371
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	242			423			803	804	420	828	769	198
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			86	81	93	53	89	97
cM capacity (veh/h)	1146			1126			221	262	624	192	275	727

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	428	428	123	146
Volume Left	16	22	32	91
Volume Right	23	84	41	25
cSH	1146	1126	307	237
Volume to Capacity	0.01	0.02	0.40	0.62
Queue Length 95th (ft)	1	1	46	91
Control Delay (s)	0.5	0.6	24.4	42.0
Lane LOS	A	A	C	E
Approach Delay (s)	0.5	0.6	24.4	42.0
Approach LOS			C	E

Intersection Summary				
Average Delay	8.5			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Oceanside Blvd
E/W Street Name	Oceanside Boulevard
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	56	218	87	0	261	212	218	0	92	646	168	0	225	549	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	62	242	96	0	289	235	242	0	102	716	186	0	249	609	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		400			766			1004			891	
Entry Volume veh/h		392			751			984			874	
Circulating Flow (v_c), pc/h	1147			880			553			626		
Exiting Flow (v_{ex}), pc/h	677			370			1020			994		
Capacity (c_{pce}), pc/h		359			469			650			604	
Capacity (c), veh/h		352			460			637			592	
v/c Ratio (x)		1.11			1.63			1.54			1.47	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		117.1			317.2			270.8			242.1	
Lane LOS		F			F			F			F	
95% Queue, veh		14.9			43.0			50.7			42.8	
Approach Delay, s/veh	117.1			317.2			270.8			242.1		
Approach LOS	F			F			F			F		
Intersection Delay, s/veh | LOS	254.0						F					

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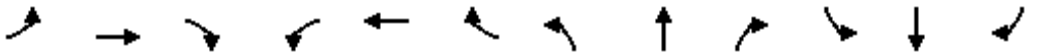

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	606	6	22	674	178	9	16	57	333	13	82
Future Volume (vph)	41	606	6	22	674	178	9	16	57	333	13	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3532		1761	3418			3119			1776	1527
Flt Permitted	0.21	1.00		0.32	1.00			0.92			0.67	1.00
Satd. Flow (perm)	382	3532		584	3418			2876			1241	1527
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	659	7	24	733	193	10	17	62	362	14	89
RTOR Reduction (vph)	0	1	0	0	48	0	0	33	0	0	0	47
Lane Group Flow (vph)	45	665	0	24	878	0	0	56	0	0	376	42
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	19.5	19.5		19.5	19.5			26.0			26.0	26.0
Effective Green, g (s)	19.5	19.5		19.5	19.5			26.0			26.0	26.0
Actuated g/C Ratio	0.35	0.35		0.35	0.35			0.47			0.47	0.47
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	135	1252		207	1211			1359			586	721
v/s Ratio Prot		0.19			c0.26							
v/s Ratio Perm	0.12			0.04				0.02			c0.30	0.03
v/c Ratio	0.33	0.53		0.12	0.73			0.04			0.64	0.06
Uniform Delay, d1	13.0	14.1		11.9	15.4			7.8			11.0	7.9
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	1.5	0.4		0.3	2.2			0.1			5.3	0.2
Delay (s)	14.5	14.5		12.2	17.6			7.9			16.3	8.0
Level of Service	B	B		B	B			A			B	A
Approach Delay (s)		14.5			17.5			7.9			14.7	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Morse Street
Agency or Co.	IBI Group	E/W Street Name	Morse Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	42	16	15	0	56	16	190	0	20	846	103	0	243	881	19
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	47	18	17	0	62	18	211	0	22	938	114	0	269	977	21
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		82			291			1074			1267	
Entry Volume veh/h		80			285			1053			1242	
Circulating Flow (v_c), pc/h	1308			1007			334			102		
Exiting Flow (v_{ex}), pc/h	401			61			1196			1056		
Capacity (c_{pce}), pc/h		306			413			809			1020	
Capacity (c), veh/h		300			405			793			1000	
v/c Ratio (x)		0.27			0.70			1.33			1.24	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		17.7			31.1			173.4			133.4	
Lane LOS		C			D			F			F	
95% Queue, veh		1.1			5.3			41.9			41.5	
Approach Delay, s/veh	17.7			31.1			173.4			133.4		
Approach LOS	C			D			F			F		
Intersection Delay, s/veh | LOS	134.8						F					

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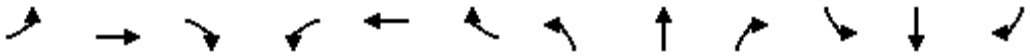
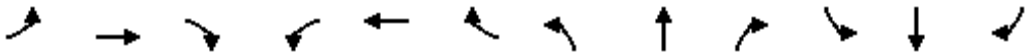


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	325	35	38	197	0	77	0	65	0	0	0
Future Volume (Veh/h)	0	325	35	38	197	0	77	0	65	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	353	38	41	214	0	84	0	71	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	214			391			668	668	372	739	687	214
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	214			391			668	668	372	739	687	214
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			77	100	89	100	100	100
cM capacity (veh/h)	1356			1168			362	366	674	290	357	826

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	391	255	155	0
Volume Left	0	41	84	0
Volume Right	38	0	71	0
cSH	1356	1168	459	1700
Volume to Capacity	0.00	0.04	0.34	0.00
Queue Length 95th (ft)	0	3	37	0
Control Delay (s)	0.0	1.6	16.8	0.0
Lane LOS		A	C	A
Approach Delay (s)	0.0	1.6	16.8	0.0
Approach LOS			C	A

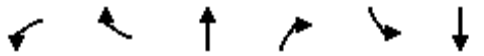
Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	170	59	0	66	0	59	1	18	0	0	0
Future Volume (Veh/h)	0	170	59	0	66	0	59	1	18	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	185	64	0	72	0	64	1	20	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	72			249			289	289	217	310	321	72
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	72			249			289	289	217	310	321	72
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			90	100	98	100	100	100
cM capacity (veh/h)	1528			1317			663	621	823	627	596	990

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	249	72	85	0
Volume Left	0	0	64	0
Volume Right	64	0	20	0
cSH	1528	1317	694	1700
Volume to Capacity	0.00	0.00	0.12	0.00
Queue Length 95th (ft)	0	0	10	0
Control Delay (s)	0.0	0.0	10.9	0.0
Lane LOS			B	A
Approach Delay (s)	0.0	0.0	10.9	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	23.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	85	302	27	48	361	27
Future Volume (vph)	85	302	27	48	361	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	92	328	29	52	392	29

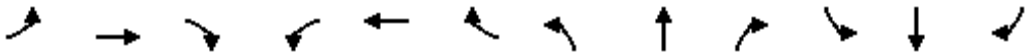
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	420	81	421
Volume Left (vph)	92	0	392
Volume Right (vph)	328	52	0
Hadj (s)	-0.39	-0.35	0.22
Departure Headway (s)	4.9	5.3	5.4
Degree Utilization, x	0.57	0.12	0.63
Capacity (veh/h)	702	608	646
Control Delay (s)	14.2	9.1	17.0
Approach Delay (s)	14.2	9.1	17.0
Approach LOS	B	A	C

Intersection Summary			
Delay	15.0		
Level of Service	B		
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	238	124	17	186	15	169	19	22	4	14	23
Future Volume (Veh/h)	9	238	124	17	186	15	169	19	22	4	14	23
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	259	135	18	202	16	184	21	24	4	15	25
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	218			394			625	600	326	627	660	210
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	218			394			625	600	326	627	660	210
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			50	95	97	99	96	97
cM capacity (veh/h)	1352			1165			367	405	715	361	374	830

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	404	236	229	44
Volume Left	10	18	184	4
Volume Right	135	16	24	25
cSH	1352	1165	390	542
Volume to Capacity	0.01	0.02	0.59	0.08
Queue Length 95th (ft)	1	1	90	7
Control Delay (s)	0.3	0.8	26.5	12.2
Lane LOS	A	A	D	B
Approach Delay (s)	0.3	0.8	26.5	12.2
Approach LOS			D	B

Intersection Summary				
Average Delay	7.5			
Intersection Capacity Utilization	47.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	249	6	18	207	5	4	4	17	2	2	1
Future Volume (Veh/h)	1	249	6	18	207	5	4	4	17	2	2	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	271	7	20	225	5	4	4	18	2	2	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	230			278			546	546	274	564	548	228
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	230			278			546	546	274	564	548	228
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			99	99	98	100	100	100
cM capacity (veh/h)	1338			1285			441	438	764	418	437	812

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	279	250	26	5
Volume Left	1	20	4	2
Volume Right	7	5	18	1
cSH	1338	1285	622	472
Volume to Capacity	0.00	0.02	0.04	0.01
Queue Length 95th (ft)	0	1	3	1
Control Delay (s)	0.0	0.8	11.0	12.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.0	0.8	11.0	12.7
Approach LOS			B	B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Cassidy Street
Agency or Co.	IBI Group	E/W Street Name	Cassidy Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	135	152	129	0	125	88	31	0	142	817	99	0	123	648	50
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	150	169	143	0	139	98	34	0	157	906	110	0	136	718	55
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			4.9763	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		462			271			1173			909	
Entry Volume veh/h		453			266			1150			891	
Circulating Flow (v_c), pc/h		993			1213			455			394	
Exiting Flow (v_{ex}), pc/h		415			310			1090			1000	
Capacity (c_{pce}), pc/h		419			336			717			923	
Capacity (c), veh/h		410			329			703			905	
v/c Ratio (x)		1.10			0.81			1.64			0.98	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		107.1			48.0			309.0			47.5	
Lane LOS		F			E			F			E	
95% Queue, veh		16.0			6.8			62.8			17.4	
Approach Delay, s/veh	107.1			48.0			309.0			47.5		
Approach LOS	F			E			F			E		
Intersection Delay, s/veh | LOS	166.3						F					

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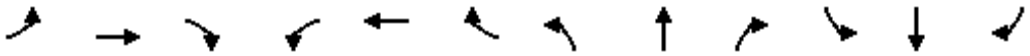
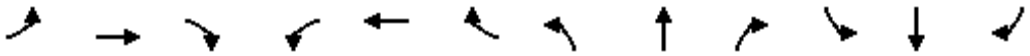


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	222	74	72	100	13	85	82	33	21	32	24
Future Volume (Veh/h)	24	222	74	72	100	13	85	82	33	21	32	24
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	241	80	78	109	14	92	89	36	23	35	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	123			321			648	612	281	686	645	116
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	123			321			648	612	281	686	645	116
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			94			72	76	95	91	90	97
cM capacity (veh/h)	1464			1239			324	376	758	265	360	936

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	347	201	217	84
Volume Left	26	78	92	23
Volume Right	80	14	36	26
cSH	1464	1239	382	397
Volume to Capacity	0.02	0.06	0.57	0.21
Queue Length 95th (ft)	1	5	85	20
Control Delay (s)	0.7	3.5	26.1	16.5
Lane LOS	A	A	D	C
Approach Delay (s)	0.7	3.5	26.1	16.5
Approach LOS			D	C

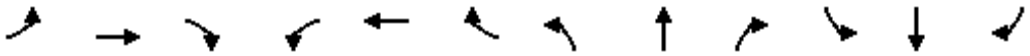
Intersection Summary			
Average Delay	9.4		
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	102	25	30	48	7	33	63	30	9	27	14
Future Volume (vph)	20	102	25	30	48	7	33	63	30	9	27	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	111	27	33	52	8	36	68	33	10	29	15

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	160	93	137	54
Volume Left (vph)	22	33	36	10
Volume Right (vph)	27	8	33	15
Hadj (s)	-0.04	0.05	-0.06	-0.10
Departure Headway (s)	4.4	4.6	4.5	4.6
Degree Utilization, x	0.20	0.12	0.17	0.07
Capacity (veh/h)	777	737	754	730
Control Delay (s)	8.5	8.2	8.4	7.9
Approach Delay (s)	8.5	8.2	8.4	7.9
Approach LOS	A	A	A	A

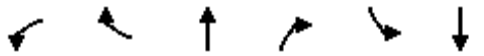
Intersection Summary				
Delay	8.3			
Level of Service	A			
Intersection Capacity Utilization	27.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	167	16	84	72	40	16	110	189	77	23	4
Future Volume (vph)	18	167	16	84	72	40	16	110	189	77	23	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	182	17	91	78	43	17	120	205	84	25	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	219	212	342	113
Volume Left (vph)	20	91	17	84
Volume Right (vph)	17	43	205	4
Hadj (s)	0.01	0.00	-0.32	0.16
Departure Headway (s)	5.5	5.5	5.0	5.8
Degree Utilization, x	0.33	0.32	0.47	0.18
Capacity (veh/h)	599	598	670	546
Control Delay (s)	11.2	11.1	12.4	10.1
Approach Delay (s)	11.2	11.1	12.4	10.1
Approach LOS	B	B	B	B

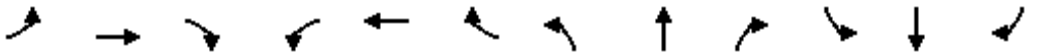
Intersection Summary				
Delay	11.5			
Level of Service	B			
Intersection Capacity Utilization	58.9%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	116	138	9	76	52
Future Volume (vph)	0	116	138	9	76	52
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	126	150	10	83	57

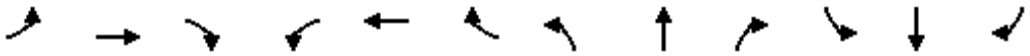
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	126	160	140
Volume Left (vph)	0	0	83
Volume Right (vph)	126	10	0
Hadj (s)	-0.57	0.00	0.15
Departure Headway (s)	4.0	4.3	4.5
Degree Utilization, x	0.14	0.19	0.17
Capacity (veh/h)	829	801	765
Control Delay (s)	7.7	8.4	8.4
Approach Delay (s)	7.7	8.4	8.4
Approach LOS	A	A	A

Intersection Summary			
Delay	8.2		
Level of Service	A		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	154	50	238	122	409	56	743	316	342	624	28
Future Volume (vph)	23	154	50	238	122	409	56	743	316	342	624	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1556		1803	1794	1770	3785		2006	3986	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1556		1803	1794	1770	3785		2006	3986	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	167	54	259	133	445	61	808	343	372	678	30
RTOR Reduction (vph)	0	0	48	0	0	192	0	42	0	0	3	0
Lane Group Flow (vph)	25	167	6	0	392	253	61	1109	0	372	705	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	12.1	12.1	12.1		24.1	44.9	7.0	30.0		20.8	43.8	
Effective Green, g (s)	12.1	12.1	12.1		24.1	44.9	7.0	30.0		20.8	43.8	
Actuated g/C Ratio	0.11	0.11	0.11		0.23	0.42	0.07	0.28		0.20	0.41	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	228	212	177		409	759	116	1070		393	1645	
v/s Ratio Prot	0.01	c0.09			c0.22	0.14	0.03	c0.29		c0.19	0.18	
v/s Ratio Perm			0.00									
v/c Ratio	0.11	0.79	0.03		0.96	0.33	0.53	1.04		0.95	0.43	
Uniform Delay, d1	42.2	45.7	41.8		40.5	20.5	47.9	38.0		42.1	22.2	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	16.2	0.0		33.5	0.3	2.0	37.3		31.7	0.8	
Delay (s)	42.2	61.9	41.8		74.0	20.8	49.9	75.3		73.8	23.0	
Level of Service	D	E	D		E	C	D	E		E	C	
Approach Delay (s)		55.5			45.7			74.1			40.5	
Approach LOS		E			D			E			D	

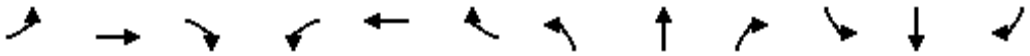
Intersection Summary			
HCM 2000 Control Delay	54.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	106.1	Sum of lost time (s)	19.1
Intersection Capacity Utilization	93.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	893	32	43	859	77	21	0	43	36	14	81
Future Volume (Veh/h)	13	893	32	43	859	77	21	0	43	36	14	81
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	971	35	47	934	84	23	0	47	39	15	88
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	1018			1006			2182	2128	988	2134	2104	976
vC1, stage 1 conf vol							1016	1016		1070	1070	
vC2, stage 2 conf vol							1166	1112		1064	1034	
vCu, unblocked vol	1018			960			2246	2187	941	2193	2160	976
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			93			80	100	84	71	92	71
cM capacity (veh/h)	682			656			116	188	292	135	181	305

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1020	1065	70	142
Volume Left	14	47	23	39
Volume Right	35	84	47	88
cSH	682	656	195	215
Volume to Capacity	0.02	0.07	0.36	0.66
Queue Length 95th (ft)	2	6	38	101
Control Delay (s)	0.7	2.3	33.5	49.4
Lane LOS	A	A	D	E
Approach Delay (s)	0.7	2.3	33.5	49.4
Approach LOS			D	E

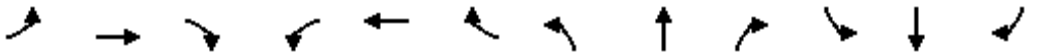
Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	91.4%	ICU Level of Service	F	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	1249	30	72	1228	92	6	5	114	36	5	22
Future Volume (Veh/h)	14	1249	30	72	1228	92	6	5	114	36	5	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	1358	33	78	1335	100	7	5	124	39	5	24
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.93			0.93	0.93	0.93	0.93	0.93	
vC, conflicting volume	1435			1392			2924	2996	1376	3056	2963	1386
vC1, stage 1 conf vol							1406	1406		1541	1541	
vC2, stage 2 conf vol							1518	1591		1514	1422	
vCu, unblocked vol	1435			1384			3030	3108	1366	3171	3072	1386
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			83			90	95	26	0	94	86
cM capacity (veh/h)	473			460			73	98	167	1	82	175

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	15	1391	78	1435	136	68
Volume Left	15	0	78	0	7	39
Volume Right	0	33	0	100	124	24
cSH	473	1700	460	1700	153	2
Volume to Capacity	0.03	0.82	0.17	0.84	0.89	31.71
Queue Length 95th (ft)	2	0	15	0	154	Err
Control Delay (s)	12.9	0.0	14.4	0.0	103.4	Err
Lane LOS	B		B		F	F
Approach Delay (s)	0.1		0.7		103.4	Err
Approach LOS					F	F

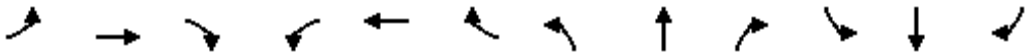
Intersection Summary				
Average Delay	222.6			
Intersection Capacity Utilization	87.1%	ICU Level of Service	E	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	1446	0	0	1488	455	0	0	0	0	0	31
Future Volume (Veh/h)	18	1446	0	0	1488	455	0	0	0	0	0	31
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	1572	0	0	1617	495	0	0	0	0	0	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2112			1572			3263	3724	1572	3476	3476	1864
vC1, stage 1 conf vol							1612	1612		1864	1864	
vC2, stage 2 conf vol							1651	2112		1612	1612	
vCu, unblocked vol	2112			1572			3263	3724	1572	3476	3476	1864
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			100			100	100	100	100	100	62
cM capacity (veh/h)	259			419			50	61	136	69	89	91

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	20	1572	0	2112	0	34
Volume Left	20	0	0	0	0	0
Volume Right	0	0	0	495	0	34
cSH	259	1700	1700	1700	1700	91
Volume to Capacity	0.08	0.92	0.00	1.24	0.00	0.38
Queue Length 95th (ft)	6	0	0	0	0	37
Control Delay (s)	20.1	0.0	0.0	0.0	0.0	66.8
Lane LOS	C				A	F
Approach Delay (s)	0.3		0.0		0.0	66.8
Approach LOS					A	F

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	116.0%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	102	0	0	127	107	994	28	127	797	10
Future Volume (Veh/h)	0	0	102	0	0	127	107	994	28	127	797	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	111	0	0	138	116	1080	30	138	866	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	2058	2490	872	2580	2480	555	877			1110		
vC1, stage 1 conf vol	1148	1148		1327	1327							
vC2, stage 2 conf vol	910	1342		1253	1153							
vCu, unblocked vol	2058	2490	872	2580	2480	555	877			1110		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	62	100	100	71	85			78		
cM capacity (veh/h)	39	46	294	6	83	475	766			625		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	111	138	116	720	390	138	877
Volume Left	0	0	116	0	0	138	0
Volume Right	111	138	0	0	30	0	11
cSH	294	475	766	1700	1700	625	1700
Volume to Capacity	0.38	0.29	0.15	0.42	0.23	0.22	0.52
Queue Length 95th (ft)	42	30	13	0	0	21	0
Control Delay (s)	24.5	15.6	10.5	0.0	0.0	12.4	0.0
Lane LOS	C	C	B			B	
Approach Delay (s)	24.5	15.6	1.0			1.7	
Approach LOS	C	C					

Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	55.5%	ICU Level of Service	B	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Michigan Avenue
Agency or Co.	IBI Group	E/W Street Name	Michigan Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	187	87	79	0	50	11	24	0	25	537	42	0	18	537	48
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	207	96	88	0	55	12	27	0	28	595	47	0	20	595	53
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		391			94			670			668	
Entry Volume veh/h		383			92			657			655	
Circulating Flow (v_c), pc/h		670			830			323			95	
Exiting Flow (v_{ex}), pc/h		163			93			829			738	
Capacity (c_{pce}), pc/h		578			493			818			1028	
Capacity (c), veh/h		567			483			802			1007	
v/c Ratio (x)		0.68			0.19			0.82			0.65	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		22.0			10.2			25.4			13.2	
Lane LOS		C			B			D			B	
95% Queue, veh		5.1			0.7			9.1			5.0	
Approach Delay, s/veh	22.0			10.2			25.4			13.2		
Approach LOS	C			B			D			B		
Intersection Delay, s/veh | LOS	19.4						C					

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HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - West
E/W Street Name	West Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	33	19	36	0	40	19	36	0	36	271	40	0	36	271	33
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	37	21	40	0	44	21	40	0	40	300	44	0	40	300	37
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		98			105			384			377	
Entry Volume veh/h		96			103			376			370	
Circulating Flow (v_c), pc/h	384			377			98			105		
Exiting Flow (v_{ex}), pc/h	105			98			377			384		
Capacity (c_{pce}), pc/h		770			775			1025			1017	
Capacity (c), veh/h		755			760			1004			997	
v/c Ratio (x)		0.13			0.14			0.37			0.37	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.1			6.2			7.6			7.6	
Lane LOS		A			A			A			A	
95% Queue, veh		0.4			0.5			1.8			1.7	
Approach Delay, s/veh	6.1			6.2			7.6			7.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.3						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Kelly
Agency or Co.	IBI Group	E/W Street Name	Kelly Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	28	43	27	0	31	26	197	0	10	317	30	0	180	300	62
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	31	48	30	0	34	29	218	0	11	351	33	0	200	333	69
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		109			281			395			602	
Entry Volume veh/h		107			275			387			590	
Circulating Flow (v_c), pc/h	567			393			279			74		
Exiting Flow (v_{ex}), pc/h	281			109			600			397		
Capacity (c_{pce}), pc/h		641			763			855			1049	
Capacity (c), veh/h		628			748			838			1029	
v/c Ratio (x)		0.17			0.37			0.46			0.57	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.7			9.4			10.2			11.0	
Lane LOS		A			A			B			B	
95% Queue, veh		0.6			1.7			2.5			3.8	
Approach Delay, s/veh	7.7			9.4			10.2			11.0		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh | LOS	10.2						B					

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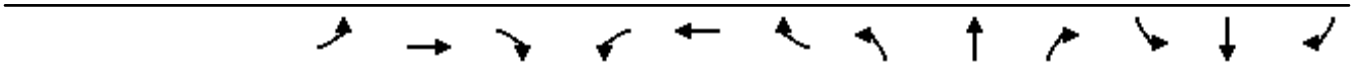


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Future Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				112	0	0	14	1151	0	26	2405	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				738	0	329	92	3173	988	92	2208	988
Arrive On Green				0.20	0.00	0.00	0.05	0.60	0.00	0.05	0.60	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				112	0	0	14	1151	0	26	2405	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Cycle Q Clear(g_c), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				738	0	329	92	3173	988	92	2208	988
V/C Ratio(X)				0.15	0.00	0.00	0.15	0.36	0.00	0.28	1.09	0.00
Avail Cap(c_a), veh/h				738	0	329	92	3173	988	92	2208	988
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				26.4	0.0	0.0	36.4	8.2	0.0	36.6	16.0	0.0
Incr Delay (d2), s/veh				0.4	0.0	0.0	3.5	0.3	0.0	7.5	48.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.0	0.4	4.4	0.0	0.7	38.7	0.0
LnGrp Delay(d),s/veh				26.8	0.0	0.0	39.8	8.5	0.0	44.1	64.3	0.0
LnGrp LOS				C			D	A		D	F	
Approach Vol, veh/h					112			1165			2431	
Approach Delay, s/veh					26.8			8.9			64.1	
Approach LOS					C			A			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	52.0			8.0	52.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	48.0			4.0	48.0		16.0
Max Q Clear Time (g_c+I1), s	3.1	10.9			2.6	50.0		4.0
Green Ext Time (p_c), s	0.0	10.6			0.0	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1123	209	317	1287	0	0
Future Volume (veh/h)	1123	209	317	1287	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	1221	227	345	1399		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	2116	947	805	3313		
Arrive On Green	0.57	0.57	0.22	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	1221	227	345	1399		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	8.4	2.7	3.3	2.5		
Cycle Q Clear(g_c), s	8.4	2.7	3.3	2.5		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2116	947	805	3313		
V/C Ratio(X)	0.58	0.24	0.43	0.42		
Avail Cap(c_a), veh/h	2116	947	805	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.4	4.2	13.3	0.3		
Incr Delay (d2), s/veh	1.2	0.6	1.7	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.4	1.4	1.8	1.2		
LnGrp Delay(d),s/veh	6.6	4.8	15.0	0.7		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1448			1744		
Approach Delay, s/veh	6.3			3.5		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			13.0	27.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			9.0	23.0				36.0
Max Q Clear Time (g_c+I1), s			5.3	10.4				4.5
Green Ext Time (p_c), s			0.5	7.5				13.7

Intersection Summary	
HCM 2010 Ctrl Delay	4.8
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1740	97	305	1324	156	0
Future Volume (veh/h)	1740	97	305	1324	156	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1891	105	332	1439	170	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1840	823	358	2419	422	376
Arrive On Green	0.50	0.50	0.10	0.66	0.23	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	1891	105	332	1439	170	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	35.0	2.4	6.4	15.4	5.5	0.0
Cycle Q Clear(g_c), s	35.0	2.4	6.4	15.4	5.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1840	823	358	2419	422	376
V/C Ratio(X)	1.03	0.13	0.93	0.59	0.40	0.00
Avail Cap(c_a), veh/h	1840	823	358	2419	422	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.5	9.3	31.2	6.8	22.9	0.0
Incr Delay (d2), s/veh	28.3	0.3	32.3	1.1	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	24.9	1.2	4.8	8.0	3.1	0.0
LnGrp Delay(d),s/veh	45.8	9.7	63.6	7.8	25.8	0.0
LnGrp LOS	F	A	E	A	C	
Approach Vol, veh/h	1996			1771	170	
Approach Delay, s/veh	43.9			18.3	25.8	
Approach LOS	D			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	11.0	39.0				50.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	7.0	35.0				46.0
Max Q Clear Time (g_c+I1), s		7.5	8.4	37.0				17.4
Green Ext Time (p_c), s		0.3	0.0	0.0				13.6

Intersection Summary	
HCM 2010 Ctrl Delay	31.6
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Future Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	680	7	89	633	0	5	0	34	90	0	53
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1244	13	217	1949	872	0	0	0	1158	0	517
Arrive On Green	0.00	0.33	0.33	0.12	0.53	0.00	0.00	0.00	0.00	0.31	0.00	0.31
Sat Flow, veh/h	0	3829	38	1845	3681	1647		0		3690	0	1647
Grp Volume(v), veh/h	0	335	352	89	633	0		0.0		90	0	53
Grp Sat Flow(s),veh/h/ln	0	1840	1930	1845	1840	1647				1845	0	1647
Q Serve(g_s), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Cycle Q Clear(g_c), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	613	643	217	1949	872				1158	0	517
V/C Ratio(X)	0.00	0.55	0.55	0.41	0.32	0.00				0.08	0.00	0.10
Avail Cap(c_a), veh/h	0	613	643	217	1949	872				1158	0	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.9	13.9	20.9	6.8	0.0				12.3	0.0	12.4
Incr Delay (d2), s/veh	0.0	3.5	3.3	5.6	0.4	0.0				0.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.4	4.6	1.5	2.6	0.0				0.5	0.0	0.6
LnGrp Delay(d),s/veh	0.0	17.3	17.2	26.5	7.3	0.0				12.4	0.0	12.8
LnGrp LOS		B	B	C	A					B		B
Approach Vol, veh/h		687			722						143	
Approach Delay, s/veh		17.3			9.6						12.6	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			10.0	21.0		20.0		31.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			6.0	17.0		16.0		27.0
Max Q Clear Time (g_c+I1), s			4.3	9.6		3.2		7.0
Green Ext Time (p_c), s			0.0	2.5		0.3		4.3

Intersection Summary	
HCM 2010 Ctrl Delay	13.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Future Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	195	751	10	30	1102	325	10	2	16	202	169	79
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	1209	16	115	1058	473	329	66	350	369	250	117
Arrive On Green	0.10	0.32	0.32	0.06	0.29	0.29	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1845	3719	50	1845	3681	1647	1550	310	1647	1845	1250	584
Grp Volume(v), veh/h	195	372	389	30	1102	325	12	0	16	202	0	248
Grp Sat Flow(s),veh/h/ln	1845	1840	1929	1845	1840	1647	1860	0	1647	1845	0	1834
Q Serve(g_s), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Cycle Q Clear(g_c), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Prop In Lane	1.00		0.03	1.00		1.00	0.83		1.00	1.00		0.32
Lane Grp Cap(c), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
V/C Ratio(X)	1.06	0.62	0.62	0.26	1.04	0.69	0.03	0.00	0.05	0.55	0.00	0.68
Avail Cap(c_a), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	22.8	22.8	35.7	28.5	25.3	25.0	0.0	25.0	28.7	0.0	29.6
Incr Delay (d2), s/veh	82.1	4.8	4.6	5.4	39.0	7.9	0.1	0.0	0.2	5.7	0.0	9.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	7.7	8.0	0.8	17.3	7.4	0.2	0.0	0.3	4.6	0.0	6.0
LnGrp Delay(d),s/veh	118.1	27.6	27.4	41.1	67.5	33.2	25.1	0.0	25.3	34.5	0.0	39.2
LnGrp LOS	F	C	C	D	F	C	C		C	C		D
Approach Vol, veh/h		956			1457			28			450	
Approach Delay, s/veh		46.0			59.3			25.2			37.1	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	30.0		20.0	12.0	27.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	26.0		16.0	8.0	23.0
Max Q Clear Time (g_c+I1), s		2.6	3.2	15.7		12.0	10.0	25.0
Green Ext Time (p_c), s		0.0	0.0	3.5		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	51.1
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Future Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	838	272	98	1080	483	394	413	351	394	413	351
Arrive On Green	0.07	0.31	0.31	0.05	0.29	0.29	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1845	2732	888	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	66	634	617	96	832	201	250	306	153	368	411	424
Grp Sat Flow(s),veh/h/ln	1845	1840	1780	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Cycle Q Clear(g_c), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Prop In Lane	1.00		0.50	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
V/C Ratio(X)	0.54	1.12	1.13	0.98	0.77	0.42	0.64	0.74	0.44	0.93	0.99	1.21
Avail Cap(c_a), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.9	26.0	26.0	35.5	24.2	21.3	26.8	27.6	25.6	29.0	29.5	29.5
Incr Delay (d2), s/veh	15.8	76.4	79.7	84.3	5.3	2.6	7.6	11.3	3.9	31.6	42.9	116.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	23.6	23.3	4.3	8.7	3.7	5.6	7.2	3.1	10.9	13.4	18.6
LnGrp Delay(d),s/veh	49.6	102.4	105.7	119.7	29.5	24.0	34.5	38.9	29.5	60.6	72.4	146.4
LnGrp LOS	D	F	F	F	C	C	C	D	C	E	E	F
Approach Vol, veh/h		1317			1129			709			1203	
Approach Delay, s/veh		101.3			36.2			35.3			94.9	
Approach LOS		F			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	27.0		20.0	9.0	26.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	23.0		16.0	5.0	22.0
Max Q Clear Time (g_c+I1), s		13.1	5.9	25.0		18.0	4.6	17.5
Green Ext Time (p_c), s		1.0	0.0	0.0		0.0	0.0	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	71.9
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Future Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	85	8	8	93	10	4	5	9	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	24%	21%	7%
Vol Thru, %	29%	72%	84%
Vol Right, %	47%	6%	9%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	17	108	102
LT Vol	4	23	7
Through Vol	5	78	86
RT Vol	8	7	9
Lane Flow Rate	18	117	111
Geometry Grp	1	1	1
Degree of Util (X)	0.021	0.132	0.124
Departure Headway (Hd)	4.088	4.052	4.014
Convergence, Y/N	Yes	Yes	Yes
Cap	860	884	891
Service Time	2.187	2.083	2.047
HCM Lane V/C Ratio	0.021	0.132	0.125
HCM Control Delay	7.3	7.7	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.4

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Future Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	212	60	34	38	0	0	0	0	30	0	50

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	212	0	0			318	318	38
Stage 1	-	-	-	-	-	-			106	106	-
Stage 2	-	-	-	-	-	-			212	212	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1358	-	0			675	598	1034
Stage 1	0	-	-	-	-	0			918	807	-
Stage 2	0	-	-	-	-	0			823	727	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1358	-	-			657	0	1034
Mov Cap-2 Maneuver	-	-	-	-	-	-			657	0	-
Stage 1	-	-	-	-	-	-			894	0	-
Stage 2	-	-	-	-	-	-			823	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	3.6	9.5
HCM LOS			A

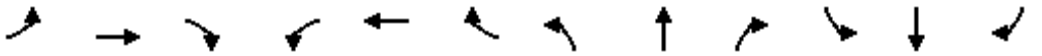
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1358	-	657	1034
HCM Lane V/C Ratio	-	-	0.025	-	0.046	0.048
HCM Control Delay (s)	-	-	7.7	0	10.7	8.7
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	945	137	935	1632	56	1428
Future Volume (veh/h)	945	137	935	1632	56	1428
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1027	0	1016	1774	61	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1302	583	1211	1401	397	624
Arrive On Green	0.35	0.00	0.34	0.72	0.22	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	1027	0	1016	1774	61	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	32.5	0.0	34.1	94.0	3.5	0.0
Cycle Q Clear(g_c), s	32.5	0.0	34.1	94.0	3.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1302	583	1211	1401	397	624
V/C Ratio(X)	0.79	0.00	0.84	1.27	0.15	0.00
Avail Cap(c_a), veh/h	1302	583	1211	1401	397	624
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.6	0.0	39.7	18.0	41.4	0.0
Incr Delay (d2), s/veh	4.9	0.0	7.0	125.7	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.4	0.0	18.0	98.3	1.9	0.0
LnGrp Delay(d),s/veh	42.5	0.0	46.8	143.7	42.2	0.0
LnGrp LOS	D		D	F	D	
Approach Vol, veh/h	1027			2790	61	
Approach Delay, s/veh	42.5			108.4	42.2	
Approach LOS	D			F	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		32.0	48.0	50.0				98.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		28.0	44.0	46.0				94.0
Max Q Clear Time (g_c+I1), s		5.5	36.1	34.5				96.0
Green Ext Time (p_c), s		0.1	2.8	5.5				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	89.9
HCM 2010 LOS	F

Appendix L.1 – Analysis Output Sheets (Future with Project Alternative 2)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	81	61	93	301	570	169	18	141	83	23	70
Future Volume (vph)	90	81	61	93	301	570	169	18	141	83	23	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3143	1441		1782	1583		1793	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3143	1441		1782	1583		1793	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	88	66	101	327	620	184	20	153	90	25	76
RTOR Reduction (vph)	0	0	58	0	229	256	0	0	91	0	0	58
Lane Group Flow (vph)	98	88	8	101	408	54	0	204	62	0	115	18
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Effective Green, g (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Actuated g/C Ratio	0.07	0.11	0.11	0.11	0.17	0.17		0.29	0.29		0.23	0.23
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	132	212	180	199	546	250		518	460		419	369
v/s Ratio Prot	c0.06	0.05		c0.06	c0.13			c0.11			c0.06	
v/s Ratio Perm			0.00			0.04			0.04			0.01
v/c Ratio	0.74	0.42	0.04	0.51	0.75	0.22		0.39	0.13		0.27	0.05
Uniform Delay, d1	33.4	30.3	29.0	30.7	28.9	26.1		20.9	19.3		23.1	21.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	20.0	0.5	0.0	2.0	4.9	0.2		2.2	0.6		1.6	0.2
Delay (s)	53.3	30.8	29.1	32.8	33.7	26.2		23.1	19.9		24.7	22.1
Level of Service	D	C	C	C	C	C		C	B		C	C
Approach Delay (s)		39.1			31.4			21.7			23.7	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	18.3
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	413	0	377	0	0	176	469	0	120	164	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	0	0	458	0	410	0	0	195	520	0	133	182	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		0		0	458	410		195	520	133	182	
Entry Volume veh/h		0		0	449	410		191	510	130	178	
Circulating Flow (Vc), pc/h	773			195			133			458		
Exiting Flow (Vex), pc/h	133			0			195			640		
Capacity (cPCE), pc/h		522		976	986			1030		802	820	
Capacity (c), veh/h		511		957	967			1009		786	804	
v/c Ratio (X)		0.00		0.00	0.46			0.19		0.17	0.22	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.0		3.8	9.2	0.0		5.3	0.0	6.3	6.9	
Lane LOS		A		A	A	A		A	A	A	A	
95% Queue		0.0		0.0	2.5			0.7		0.6	0.8	
Approach Delay, s/veh				4.8			1.5			6.6		
Approach LOS				A			A			A		
Intersection Delay, s/veh / LOS	3.9						A					

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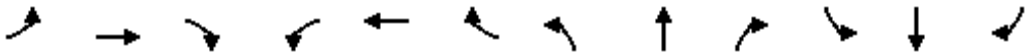
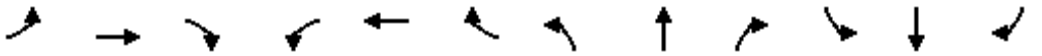


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	22	4	43	28	84	12	56	62	125	77	6
Future Volume (vph)	2	22	4	43	28	84	12	56	62	125	77	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	24	4	47	30	91	13	61	67	136	84	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	30	168	141	227
Volume Left (vph)	2	47	13	136
Volume Right (vph)	4	91	67	7
Hadj (s)	-0.03	-0.24	-0.23	0.14
Departure Headway (s)	5.0	4.6	4.4	4.7
Degree Utilization, x	0.04	0.21	0.17	0.30
Capacity (veh/h)	652	727	766	731
Control Delay (s)	8.2	8.8	8.4	9.6
Approach Delay (s)	8.2	8.8	8.4	9.6
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	40.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	173	17	47	9	33	67	44	287	20	26	394	99
Future Volume (vph)	173	17	47	9	33	67	44	287	20	26	394	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1781	1583		1701		1770	1844		1770	1863	1583
Flt Permitted		0.63	1.00		0.98		0.46	1.00		0.53	1.00	1.00
Satd. Flow (perm)		1174	1583		1668		848	1844		993	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	188	18	51	10	36	73	48	312	22	28	428	108
RTOR Reduction (vph)	0	0	37	0	53	0	0	3	0	0	0	38
Lane Group Flow (vph)	0	206	14	0	66	0	48	331	0	28	428	70
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		22.0	22.0		22.0		50.8	50.8		52.0	52.0	52.0
Effective Green, g (s)		22.0	22.0		22.0		50.8	50.8		52.0	52.0	52.0
Actuated g/C Ratio		0.28	0.28		0.28		0.63	0.63		0.65	0.65	0.65
Clearance Time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		7.0	7.0	7.0
Lane Grp Cap (vph)		322	435		458		538	1170		645	1210	1028
v/s Ratio Prot								0.18			c0.23	
v/s Ratio Perm		c0.18	0.01		0.04		0.06			0.03		0.04
v/c Ratio		0.64	0.03		0.14		0.09	0.28		0.04	0.35	0.07
Uniform Delay, d1		25.5	21.2		21.9		5.6	6.5		5.0	6.4	5.1
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		7.9	0.1		0.5		0.3	0.6		0.1	0.8	0.1
Delay (s)		33.4	21.3		22.4		6.0	7.1		5.2	7.2	5.3
Level of Service		C	C		C		A	A		A	A	A
Approach Delay (s)		31.0			22.4			7.0			6.7	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	13	10	9	0	23	14	22	0	7	281	28	0	63	334	13
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	14	11	10	0	26	16	24	0	8	312	31	0	70	370	14
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		35			66			351			454	
Entry Volume veh/h		34			65			344			445	
Circulating Flow (Vc), pc/h		466			334			95			50	
Exiting Flow (Vex), pc/h		112			38			350			406	
Capacity (cPCE), pc/h		709			809			1028			1075	
Capacity (c), veh/h		695			793			1007			1054	
v/c Ratio (X)		0.05			0.08			0.34			0.42	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.7			5.3			7.1			8.0	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.3			1.5			2.1	
Approach Delay, s/veh	5.7			5.3			7.1			8.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	7.4						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/12/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	7	11	11	0	12	17	18	0	8	326	13	0	13	284	22
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	8	12	12	0	13	19	20	0	9	361	14	0	14	315	24
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		32			52			384			353	
Entry Volume veh/h		31			51			376			346	
Circulating Flow (Vc), pc/h		342			378			34			41	
Exiting Flow (Vex), pc/h		40			52			389			340	
Capacity (cPCE), pc/h		803			774			1092			1085	
Capacity (c), veh/h		787			759			1071			1063	
v/c Ratio (X)		0.04			0.07			0.35			0.33	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.0			5.4			6.9			6.6	
Lane LOS		A			A			A			A	
95% Queue		0.1			0.2			1.6			1.4	
Approach Delay, s/veh	5.0			5.4			6.9			6.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.6						A					

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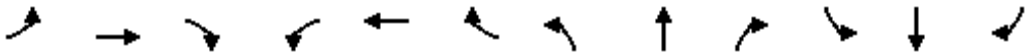
HCM Unsignalized Intersection Capacity Analysis
7: Horne St & Pier View Way

11/17/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	3	19	9	5	4	86	216	3	5	148	7
Future Volume (vph)	2	3	19	9	5	4	86	216	3	5	148	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	3	21	10	5	4	93	235	3	5	161	8

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	5	21	19	211	121	86	89
Volume Left (vph)	2	0	10	93	0	5	0
Volume Right (vph)	0	21	4	0	3	0	8
Hadj (s)	0.23	-0.67	0.01	0.25	0.02	0.06	-0.03
Departure Headway (s)	5.9	5.0	5.6	5.0	4.8	5.0	4.9
Degree Utilization, x	0.01	0.03	0.03	0.29	0.16	0.12	0.12
Capacity (veh/h)	563	660	588	705	737	704	720
Control Delay (s)	7.7	6.9	8.8	8.9	7.5	7.4	7.3
Approach Delay (s)	7.1		8.8	8.4		7.4	
Approach LOS	A		A	A		A	

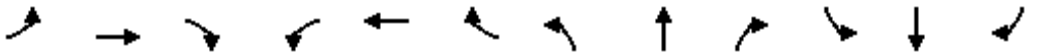
Intersection Summary				
Delay	8.0			
Level of Service	A			
Intersection Capacity Utilization	30.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	129	57	126	91	33	111
Future Volume (vph)	129	57	126	91	33	111
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	140	62	137	99	36	121

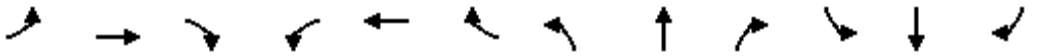
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	140	62	236	157
Volume Left (vph)	140	0	0	36
Volume Right (vph)	0	62	99	0
Hadj (s)	0.53	-0.67	-0.22	0.08
Departure Headway (s)	6.0	4.8	4.4	4.8
Degree Utilization, x	0.23	0.08	0.29	0.21
Capacity (veh/h)	569	708	776	708
Control Delay (s)	9.5	7.0	9.3	9.1
Approach Delay (s)	8.8		9.3	9.1
Approach LOS	A		A	A

Intersection Summary			
Delay	9.0		
Level of Service	A		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		



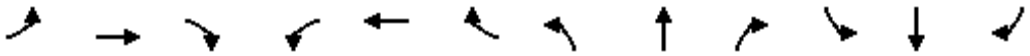
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	132	38	169	33	0	0	0	0	31	41
Future Volume (vph)	18	0	132	38	169	33	0	0	0	0	31	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.98						0.91	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3452						3237	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3452						3237	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	0	143	41	184	36	0	0	0	0	34	45
RTOR Reduction (vph)	0	0	130	16	14	0	0	0	0	0	42	0
Lane Group Flow (vph)	20	0	13	25	206	0	0	0	0	0	37	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	5.3		5.3	37.1	37.1						4.1	
Effective Green, g (s)	5.3		5.3	37.1	37.1						4.1	
Actuated g/C Ratio	0.09		0.09	0.62	0.62						0.07	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	156		246	1094	2134						221	
v/s Ratio Prot	c0.01		0.00	0.01	c0.06						c0.01	
v/s Ratio Perm												
v/c Ratio	0.13		0.05	0.02	0.10						0.17	
Uniform Delay, d1	25.2		25.0	4.4	4.6						26.3	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.4		0.1	0.0	0.1						0.4	
Delay (s)	25.6		25.1	4.5	4.7						26.7	
Level of Service	C		C	A	A						C	
Approach Delay (s)		25.2			4.7			0.0			26.7	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	23.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	144	213	73	67	585	0	0	333	30
Future Volume (vph)	0	0	0	144	213	73	67	585	0	0	333	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1525	1770	1863			1767	1460
Flt Permitted				0.95	1.00	1.00	0.37	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1525	686	1863			1767	1460
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	157	232	79	73	636	0	0	362	33
RTOR Reduction (vph)	0	0	0	0	0	55	0	0	0	0	1	22
Lane Group Flow (vph)	0	0	0	157	232	24	73	636	0	0	364	8
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.1	18.1	18.1	32.7	32.7			17.1	17.1
Effective Green, g (s)				18.1	18.1	18.1	32.7	32.7			17.1	17.1
Actuated g/C Ratio				0.30	0.30	0.30	0.54	0.54			0.28	0.28
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				526	1053	453	557	1001			496	410
v/s Ratio Prot				c0.09	0.07		0.02	c0.34			c0.21	
v/s Ratio Perm						0.02	0.05					0.01
v/c Ratio				0.30	0.22	0.05	0.13	0.64			0.73	0.02
Uniform Delay, d1				16.5	16.0	15.2	10.8	9.9			19.8	15.8
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				1.4	0.5	0.2	0.1	1.5			5.9	0.0
Delay (s)				17.9	16.5	15.4	11.0	11.4			25.7	15.8
Level of Service				B	B	B	B	B			C	B
Approach Delay (s)		0.0			16.8			11.3			25.0	
Approach LOS		A			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	115	1	124	433	199	11	24	188	134	47	6
Future Volume (vph)	23	115	1	124	433	199	11	24	188	134	47	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3535		1770	3539	1583		1834	1583	1681	1714	
Flt Permitted	0.42	1.00		0.67	1.00	1.00		0.94	1.00	0.73	0.90	
Satd. Flow (perm)	779	3535		1252	3539	1583		1754	1583	1296	1572	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	125	1	135	471	216	12	26	204	146	51	7
RTOR Reduction (vph)	0	1	0	0	0	160	0	0	85	0	3	0
Lane Group Flow (vph)	25	125	0	135	471	56	0	38	119	101	100	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	15.9	15.9		15.5	15.5	15.5		34.9	34.9	34.9	34.9	
Effective Green, g (s)	15.9	15.9		15.5	15.5	15.5		34.9	34.9	34.9	34.9	
Actuated g/C Ratio	0.27	0.27		0.26	0.26	0.26		0.58	0.58	0.58	0.58	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	206	936		323	914	408		1020	920	753	914	
v/s Ratio Prot		0.04			c0.13							
v/s Ratio Perm	0.03			0.11		0.04		0.02	0.07	c0.08	0.06	
v/c Ratio	0.12	0.13		0.42	0.52	0.14		0.04	0.13	0.13	0.11	
Uniform Delay, d1	16.7	16.8		18.5	19.0	17.1		5.4	5.7	5.7	5.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.1		1.0	0.6	0.2		0.1	0.3	0.4	0.2	
Delay (s)	17.1	16.9		19.5	19.6	17.3		5.4	6.0	6.1	5.8	
Level of Service	B	B		B	B	B		A	A	A	A	
Approach Delay (s)		16.9			19.0			5.9			6.0	
Approach LOS		B			B			A			A	

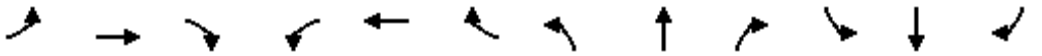
Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	89	6	21	31	6	8
Future Volume (Veh/h)	89	6	21	31	6	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	97	7	23	34	7	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			104		180	100
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			104		180	100
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	99
cM capacity (veh/h)			1488		796	955

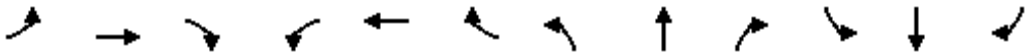
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	104	57	16
Volume Left	0	23	7
Volume Right	7	0	9
cSH	1700	1488	878
Volume to Capacity	0.06	0.02	0.02
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	3.1	9.2
Lane LOS		A	A
Approach Delay (s)	0.0	3.1	9.2
Approach LOS			A

Intersection Summary			
Average Delay		1.8	
Intersection Capacity Utilization		19.5%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	55	96	0	0	0	27	222	64	75	215	53
Future Volume (vph)	89	55	96	0	0	0	27	222	64	75	215	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.94				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1494				1770	1863	1551	1770	1863	1515
Flt Permitted	0.95	1.00	1.00				0.61	1.00	1.00	0.42	1.00	1.00
Satd. Flow (perm)	1770	1863	1494				1142	1863	1551	783	1863	1515
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	60	104	0	0	0	29	241	70	82	234	58
RTOR Reduction (vph)	0	0	55	0	0	0	0	0	51	0	0	36
Lane Group Flow (vph)	97	60	49	0	0	0	29	241	19	82	234	22
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	28.0	28.0	28.0				16.0	16.0	16.0	23.2	23.2	23.2
Effective Green, g (s)	28.0	28.0	28.0				16.0	16.0	16.0	23.2	23.2	23.2
Actuated g/C Ratio	0.47	0.47	0.47				0.27	0.27	0.27	0.39	0.39	0.39
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	826	869	697				304	496	413	355	720	585
v/s Ratio Prot	c0.05	0.03						c0.13		0.01	c0.13	
v/s Ratio Perm			0.03				0.03		0.01	0.08		0.01
v/c Ratio	0.12	0.07	0.07				0.10	0.49	0.05	0.23	0.33	0.04
Uniform Delay, d1	9.0	8.8	8.8				16.6	18.5	16.3	12.2	12.9	11.5
Progression Factor	1.00	1.00	1.00				0.71	0.70	0.27	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	0.2				0.6	3.4	0.2	0.3	1.2	0.1
Delay (s)	9.3	9.0	9.0				12.4	16.3	4.6	12.5	14.1	11.6
Level of Service	A	A	A				B	B	A	B	B	B
Approach Delay (s)		9.1			0.0			13.6			13.4	
Approach LOS		A			A			B			B	

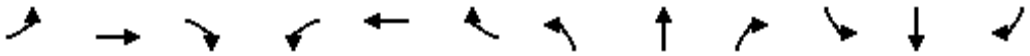
Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	209	10	0	0	0	0	4	17	20	7	0
Future Volume (Veh/h)	10	209	10	0	0	0	0	4	17	20	7	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	227	11	0	0	0	0	4	18	22	8	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			238			258	254	119	156	260	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			238			258	254	119	156	260	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	98	97	99	100
cM capacity (veh/h)	1622			1326			664	644	910	773	639	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	124	124	22	30
Volume Left	11	0	0	22
Volume Right	0	11	18	0
cSH	1622	1700	846	732
Volume to Capacity	0.01	0.07	0.03	0.04
Queue Length 95th (ft)	1	0	2	3
Control Delay (s)	0.7	0.0	9.4	10.1
Lane LOS	A		A	B
Approach Delay (s)	0.3		9.4	10.1
Approach LOS			A	B

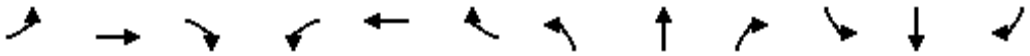
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	21.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	24	473	5	0	0	0	0	4	21	14	12	0
Future Volume (vph)	24	473	5	0	0	0	0	4	21	14	12	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	514	5	0	0	0	0	4	23	15	13	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	283	262	27	28
Volume Left (vph)	26	0	0	15
Volume Right (vph)	0	5	23	0
Hadj (s)	0.08	0.02	-0.48	0.14
Departure Headway (s)	4.7	4.7	4.6	5.2
Degree Utilization, x	0.37	0.34	0.03	0.04
Capacity (veh/h)	755	761	730	643
Control Delay (s)	9.3	8.8	7.7	8.4
Approach Delay (s)	9.1		7.7	8.4
Approach LOS	A		A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	28.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	97	187	9	40	0	97	0	47	29	0	0	0
Future Volume (vph)	97	187	9	40	0	97	0	47	29	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	105	203	10	43	0	105	0	51	32	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	105	213	148	83
Volume Left (vph)	105	0	43	0
Volume Right (vph)	0	10	105	32
Hadj (s)	0.53	0.00	-0.33	-0.20
Departure Headway (s)	5.4	4.8	4.2	4.7
Degree Utilization, x	0.16	0.29	0.17	0.11
Capacity (veh/h)	660	730	821	703
Control Delay (s)	8.1	8.5	8.1	8.3
Approach Delay (s)	8.4		8.1	8.3
Approach LOS	A		A	A

Intersection Summary				
Delay	8.3			
Level of Service	A			
Intersection Capacity Utilization	32.8%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	14	0	0	51	14	224	32	23	232	6
Future Volume (Veh/h)	0	0	14	0	0	51	14	224	32	23	232	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	15	0	0	55	15	243	35	25	252	7
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked												
vC, conflicting volume	640	628	262	614	614	268	266			285		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	640	628	262	614	614	268	266			285		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	93	99			98		
cM capacity (veh/h)	346	382	772	380	389	765	1290			1267		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	15	55	15	278	25	259
Volume Left	0	0	15	0	25	0
Volume Right	15	55	0	35	0	7
cSH	772	765	1290	1700	1267	1700
Volume to Capacity	0.02	0.07	0.01	0.16	0.02	0.15
Queue Length 95th (ft)	1	6	1	0	2	0
Control Delay (s)	9.8	10.1	7.8	0.0	7.9	0.0
Lane LOS	A	B	A		A	
Approach Delay (s)	9.8	10.1	0.4		0.7	
Approach LOS	A	B				

Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	23.8%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	2	25	0	59	9	4	0	18	226	11	0	3	235	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	16	2	28	0	65	10	4	0	20	251	12	0	3	261	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		46			79			283			284	
Entry Volume veh/h		45			77			277			278	
Circulating Flow (Vc), pc/h	329			287			21			95		
Exiting Flow (Vex), pc/h	17			50			271			354		
Capacity (cPCE), pc/h		813			848			1107			1028	
Capacity (c), veh/h		797			831			1085			1007	
v/c Ratio (X)		0.06			0.09			0.26			0.28	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.1			5.2			5.7			6.3	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.3			1.0			1.1	
Approach Delay, s/veh	5.1			5.2			5.7			6.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	5.9						A					

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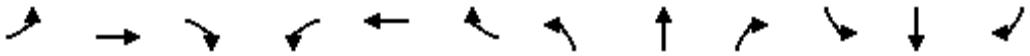
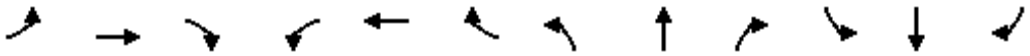


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	30	16	25	4	79	3	136	39	93	93	1
Future Volume (vph)	20	30	16	25	4	79	3	136	39	93	93	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	33	17	27	4	86	3	148	42	101	101	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	72	117	193	203
Volume Left (vph)	22	27	3	101
Volume Right (vph)	17	86	42	1
Hadj (s)	-0.05	-0.36	-0.09	0.13
Departure Headway (s)	5.0	4.6	4.5	4.7
Degree Utilization, x	0.10	0.15	0.24	0.27
Capacity (veh/h)	657	713	756	722
Control Delay (s)	8.5	8.4	9.0	9.4
Approach Delay (s)	8.5	8.4	9.0	9.4
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	37.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	202	22	4	93	15	11	23	27	20	32	11
Future Volume (Veh/h)	8	202	22	4	93	15	11	23	27	20	32	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	220	24	4	101	16	12	25	29	22	35	12
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	131			251			404	396	239	422	400	124
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	131			251			404	396	239	422	400	124
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			98	95	96	95	93	99
cM capacity (veh/h)	1437			1307			507	527	795	487	524	915

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	253	121	66	69
Volume Left	9	4	12	22
Volume Right	24	16	29	12
cSH	1437	1307	613	552
Volume to Capacity	0.01	0.00	0.11	0.13
Queue Length 95th (ft)	0	0	9	11
Control Delay (s)	0.3	0.3	11.6	12.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	11.6	12.5
Approach LOS			B	B

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	28.1%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Wisconsin Avenue
Agency or Co.	IBI Group	E/W Street Name	Wisconsin Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Period	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	51	56	131	0	93	30	29	0	64	234	67	0	18	257	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	57	62	145	0	103	33	32	0	71	259	74	0	20	285	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		264			168			404			324	
Entry Volume veh/h		259			165			396			318	
Circulating Flow (Vc), pc/h		408			387			139			207	
Exiting Flow (Vex), pc/h		156			123			348			533	
Capacity (cPCE), pc/h		751			767			983			919	
Capacity (c), veh/h		737			752			964			901	
v/c Ratio (X)		0.35			0.22			0.41			0.35	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.3			7.2			8.4			7.9	
Lane LOS		A			A			A			A	
95% Queue		1.6			0.8			2.0			1.6	
Approach Delay, s/veh	9.3			7.2			8.4			7.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	8.3						A					

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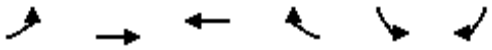
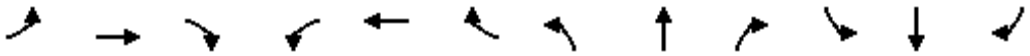


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	221	214	5	17	15
Future Volume (Veh/h)	9	221	214	5	17	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	240	233	5	18	16
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	246				504	244
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	246				504	244
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	98
cM capacity (veh/h)	1311				519	788

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	250	238	34
Volume Left	10	0	18
Volume Right	0	5	16
cSH	1311	1700	619
Volume to Capacity	0.01	0.14	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.4	0.0	11.2
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	11.2
Approach LOS			B

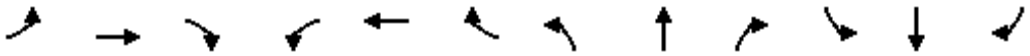
Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		29.3%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	206	9	20	195	11	6	5	14	36	1	6
Future Volume (Veh/h)	7	206	9	20	195	11	6	5	14	36	1	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	224	10	22	212	12	7	5	15	39	1	7
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	226			234			516	515	229	526	514	222
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	226			234			516	515	229	526	514	222
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			98	99	98	91	100	99
cM capacity (veh/h)	1340			1333			455	452	810	441	453	815

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	242	246	27	47
Volume Left	8	22	7	39
Volume Right	10	12	15	7
cSH	1340	1333	601	473
Volume to Capacity	0.01	0.02	0.04	0.10
Queue Length 95th (ft)	0	1	4	8
Control Delay (s)	0.3	0.8	11.3	13.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	11.3	13.4
Approach LOS			B	B

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	33.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	114	188	71	144	0	101	0	36	0	0	0
Future Volume (vph)	0	114	188	71	144	0	101	0	36	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	124	204	77	157	0	110	0	39	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	328	234	149	0
Volume Left (vph)	0	77	110	0
Volume Right (vph)	204	0	39	0
Hadj (s)	-0.34	0.10	0.02	0.00
Departure Headway (s)	4.3	4.8	5.2	5.4
Degree Utilization, x	0.39	0.31	0.21	0.00
Capacity (veh/h)	815	720	634	900
Control Delay (s)	9.9	9.9	9.6	8.4
Approach Delay (s)	9.9	9.9	9.6	0.0
Approach LOS	A	A	A	A

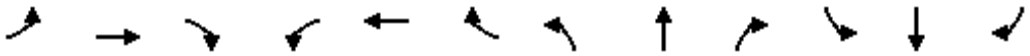
Intersection Summary				
Delay	9.8			
Level of Service	A			
Intersection Capacity Utilization	51.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	48	67	85	30	78	102
Future Volume (vph)	48	67	85	30	78	102
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	73	92	33	85	111

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	125	125	196
Volume Left (vph)	52	0	85
Volume Right (vph)	73	33	0
Hadj (s)	-0.23	-0.12	0.12
Departure Headway (s)	4.4	4.3	4.5
Degree Utilization, x	0.15	0.15	0.24
Capacity (veh/h)	760	803	776
Control Delay (s)	8.2	8.0	8.9
Approach Delay (s)	8.2	8.0	8.9
Approach LOS	A	A	A

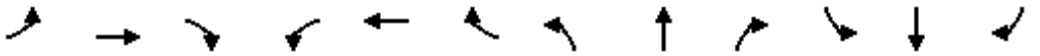
Intersection Summary			
Delay	8.4		
Level of Service	A		
Intersection Capacity Utilization	29.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	246	1	6	198	36	7	9	12	36	15	9
Future Volume (Veh/h)	7	246	1	6	198	36	7	9	12	36	15	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	267	1	7	215	39	8	10	13	39	16	10
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.93						0.93	0.93		0.93	0.93	0.93
vC, conflicting volume	257			279			565	566	286	561	546	242
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	164			279			495	496	286	491	476	148
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	98	98	91	96	99
cM capacity (veh/h)	1313			1272			420	432	741	427	444	832

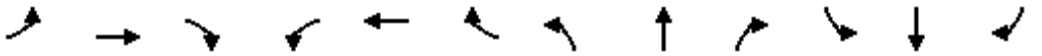
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	276	261	31	65
Volume Left	8	7	8	39
Volume Right	1	39	13	10
cSH	1313	1272	519	466
Volume to Capacity	0.01	0.01	0.06	0.14
Queue Length 95th (ft)	0	0	5	12
Control Delay (s)	0.3	0.3	12.4	14.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	12.4	14.0
Approach LOS			B	B

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	30.9%	ICU Level of Service	A	
Analysis Period (min)	15			



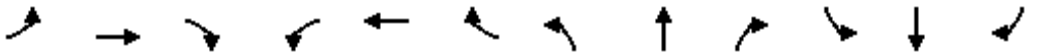
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	139	78	108	141	98	40	202	57	107	256	16
Future Volume (vph)	22	139	78	108	141	98	40	202	57	107	256	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	10	11	11	16	16	16
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1850	1534	1681	1763	1794	1652	3295		2006	2093	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1850	1534	1681	1763	1794	1652	3295		2006	2093	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	151	85	117	153	107	43	220	62	116	278	17
RTOR Reduction (vph)	0	0	72	0	0	89	0	30	0	0	2	0
Lane Group Flow (vph)	0	175	13	105	165	18	43	252	0	116	293	0
Confl. Peds. (#/hr)			10	10					3			
Confl. Bikes (#/hr)			4						3			
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		11.9	11.9	13.1	13.1	13.1	4.1	25.8		10.4	32.1	
Effective Green, g (s)		11.9	11.9	13.1	13.1	13.1	4.1	25.8		10.4	32.1	
Actuated g/C Ratio		0.15	0.15	0.16	0.16	0.16	0.05	0.32		0.13	0.40	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		275	228	275	288	293	84	1062		260	839	
v/s Ratio Prot		c0.09		0.06	c0.09		0.03	0.08		c0.06	c0.14	
v/s Ratio Perm			0.01			0.01						
v/c Ratio		0.64	0.06	0.38	0.57	0.06	0.51	0.24		0.45	0.35	
Uniform Delay, d1		32.0	29.2	29.8	30.9	28.2	37.0	19.9		32.1	16.7	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.5	0.0	1.0	3.0	0.1	2.2	0.5		1.2	1.1	
Delay (s)		35.5	29.3	30.9	33.8	28.4	39.2	20.4		33.4	17.8	
Level of Service		D	C	C	C	C	D	C		C	B	
Approach Delay (s)		33.5			31.5			22.9			22.2	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



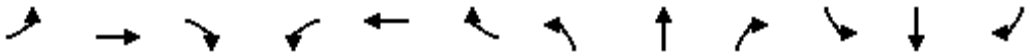
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	345	0	16	445	87	8	9	35	267	14	48
Future Volume (vph)	12	345	0	16	445	87	8	9	35	267	14	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3539		1755	3443			3125			1777	1524
Flt Permitted	0.30	1.00		0.49	1.00			0.92			0.69	1.00
Satd. Flow (perm)	557	3539		909	3443			2887			1290	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	375	0	17	484	95	9	10	38	290	15	52
RTOR Reduction (vph)	0	0	0	0	34	0	0	16	0	0	0	21
Lane Group Flow (vph)	13	375	0	17	545	0	0	41	0	0	305	31
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	15.0	15.0		15.0	15.0			35.5			35.5	35.5
Effective Green, g (s)	15.0	15.0		15.0	15.0			35.5			35.5	35.5
Actuated g/C Ratio	0.25	0.25		0.25	0.25			0.59			0.59	0.59
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	139	884		227	860			1708			763	901
v/s Ratio Prot		0.11			c0.16							
v/s Ratio Perm	0.02			0.02				0.01			c0.24	0.02
v/c Ratio	0.09	0.42		0.07	0.63			0.02			0.40	0.03
Uniform Delay, d1	17.3	18.9		17.2	20.1			5.1			6.6	5.1
Progression Factor	0.82	0.84		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.3	0.3		0.1	1.5			0.0			1.6	0.1
Delay (s)	14.5	16.2		17.3	21.6			5.1			8.1	5.2
Level of Service	B	B		B	C			A			A	A
Approach Delay (s)		16.1			21.5			5.1			7.7	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	12	16	27	8	100	2	330	54	84	445	16
Future Volume (vph)	23	12	16	27	8	100	2	330	54	84	445	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	10	11	16
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1737			1792	1794	1770	3912		1652	3404	
Flt Permitted		0.84			0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1484			1822	1794	1770	3912		1652	3404	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	13	17	29	9	109	2	359	59	91	484	17
RTOR Reduction (vph)	0	15	0	0	0	98	0	19	0	0	3	0
Lane Group Flow (vph)	0	40	0	0	38	11	2	399	0	91	498	0
Confl. Peds. (#/hr)			4	4					3			
Confl. Bikes (#/hr)			1						2			
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		3.6			3.6	3.6	0.6	15.9		4.0	19.3	
Effective Green, g (s)		3.6			3.6	3.6	0.6	15.9		4.0	19.3	
Actuated g/C Ratio		0.10			0.10	0.10	0.02	0.43		0.11	0.52	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		143			176	173	28	1672		177	1766	
v/s Ratio Prot							0.00	0.10		c0.06	c0.15	
v/s Ratio Perm		c0.03			0.02	0.01						
v/c Ratio		0.28			0.22	0.06	0.07	0.24		0.51	0.28	
Uniform Delay, d1		15.6			15.5	15.3	18.0	6.8		15.7	5.0	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.2	0.1	1.1	0.1		2.5	0.1	
Delay (s)		16.0			15.7	15.3	19.1	6.9		18.2	5.1	
Level of Service		B			B	B	B	A		B	A	
Approach Delay (s)		16.0			15.4			6.9			7.1	
Approach LOS		B			B			A			A	

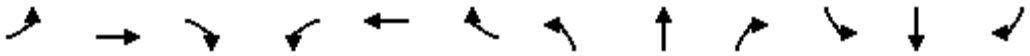
Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.32		
Actuated Cycle Length (s)	37.2	Sum of lost time (s)	13.7
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	130	22	34	112	0	19	0	28	0	0	0
Future Volume (Veh/h)	0	130	22	34	112	0	19	0	28	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	141	24	37	122	0	21	0	30	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	122			165			349	349	153	379	361	122
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	122			165			349	349	153	379	361	122
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			96	100	97	100	100	100
cM capacity (veh/h)	1465			1413			594	560	893	548	551	929

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	165	159	51	0
Volume Left	0	37	21	0
Volume Right	24	0	30	0
cSH	1465	1413	739	1700
Volume to Capacity	0.00	0.03	0.07	0.00
Queue Length 95th (ft)	0	2	6	0
Control Delay (s)	0.0	1.9	10.2	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	1.9	10.2	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	29.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	63	10	2	45	1	17	0	7	1	0	1
Future Volume (Veh/h)	1	63	10	2	45	1	17	0	7	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	68	11	2	49	1	18	0	8	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	50			79			130	130	74	137	134	50
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	50			79			130	130	74	137	134	50
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			98	100	99	100	100	100
cM capacity (veh/h)	1557			1519			841	760	988	826	755	1019

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	80	52	26	2
Volume Left	1	2	18	1
Volume Right	11	1	8	1
cSH	1557	1519	881	912
Volume to Capacity	0.00	0.00	0.03	0.00
Queue Length 95th (ft)	0	0	2	0
Control Delay (s)	0.1	0.3	9.2	9.0
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.3	9.2	9.0
Approach LOS			A	A

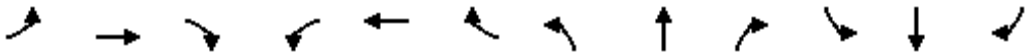
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	14.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	36	87	14	36	108	14
Future Volume (vph)	36	87	14	36	108	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	95	15	39	117	15

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	134	54	132
Volume Left (vph)	39	0	117
Volume Right (vph)	95	39	0
Hadj (s)	-0.33	-0.40	0.21
Departure Headway (s)	4.0	3.9	4.4
Degree Utilization, x	0.15	0.06	0.16
Capacity (veh/h)	864	870	783
Control Delay (s)	7.7	7.2	8.3
Approach Delay (s)	7.7	7.2	8.3
Approach LOS	A	A	A

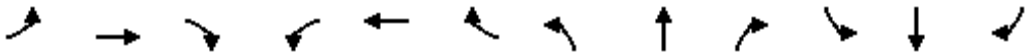
Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	101	76	12	67	3	57	8	12	12	9	4
Future Volume (Veh/h)	3	101	76	12	67	3	57	8	12	12	9	4
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	110	83	13	73	3	62	9	13	13	10	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	76			193			267	260	152	276	300	74
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	76			193			267	260	152	276	300	74
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			91	99	99	98	98	100
cM capacity (veh/h)	1523			1380			668	638	895	654	606	987

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	196	89	84	27
Volume Left	3	13	62	13
Volume Right	83	3	13	4
cSH	1523	1380	692	668
Volume to Capacity	0.00	0.01	0.12	0.04
Queue Length 95th (ft)	0	1	10	3
Control Delay (s)	0.1	1.2	10.9	10.6
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	1.2	10.9	10.6
Approach LOS			B	B

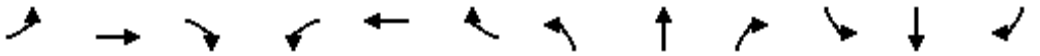
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	24.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	127	4	3	79	2	1	1	8	1	1	1
Future Volume (Veh/h)	0	127	4	3	79	2	1	1	8	1	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	138	4	3	86	2	1	1	9	1	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	88			142			234	234	140	242	235	87
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	88			142			234	234	140	242	235	87
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	100	100	100
cM capacity (veh/h)	1508			1441			717	665	908	702	664	971

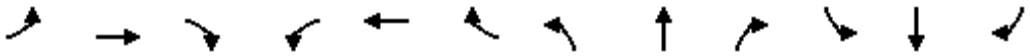
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	142	91	11	3
Volume Left	0	3	1	1
Volume Right	4	2	9	1
cSH	1508	1441	859	758
Volume to Capacity	0.00	0.00	0.01	0.00
Queue Length 95th (ft)	0	0	1	0
Control Delay (s)	0.0	0.3	9.2	9.8
Lane LOS		A	A	A
Approach Delay (s)	0.0	0.3	9.2	9.8
Approach LOS			A	A

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	16.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	78	52	59	36	18	65	278	34	42	305	13
Future Volume (vph)	58	78	52	59	36	18	65	278	34	42	305	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.96			0.98		1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1766			1776		1770	3481		1770	3518	
Flt Permitted		0.86			0.77		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1550			1401		1770	3481		1770	3518	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	63	85	57	64	39	20	71	302	37	46	332	14
RTOR Reduction (vph)	0	22	0	0	10	0	0	14	0	0	4	0
Lane Group Flow (vph)	0	183	0	0	113	0	71	325	0	46	342	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		8.6			8.2		4.4	18.3		1.9	15.6	
Effective Green, g (s)		8.6			8.2		4.4	18.3		1.9	15.6	
Actuated g/C Ratio		0.20			0.19		0.10	0.43		0.04	0.37	
Clearance Time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		314			270		183	1502		79	1294	
v/s Ratio Prot							c0.04	0.09		c0.03	c0.10	
v/s Ratio Perm		c0.12			0.08							
v/c Ratio		0.58			0.42		0.39	0.22		0.58	0.26	
Uniform Delay, d1		15.3			15.0		17.7	7.6		19.9	9.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.8			1.2		0.5	0.1		10.5	0.1	
Delay (s)		18.0			16.2		18.2	7.6		30.3	9.5	
Level of Service		B			B		B	A		C	A	
Approach Delay (s)		18.0			16.2			9.5			11.9	
Approach LOS		B			B			A			B	

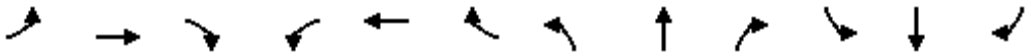
Intersection Summary			
HCM 2000 Control Delay	12.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	42.4	Sum of lost time (s)	14.2
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	87	22	26	50	12	9	23	22	9	19	17
Future Volume (Veh/h)	15	87	22	26	50	12	9	23	22	9	19	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	95	24	28	54	13	10	25	24	10	21	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	67			119			284	262	107	292	268	60
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	67			119			284	262	107	292	268	60
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			98	96	97	98	97	98
cM capacity (veh/h)	1535			1469			625	624	947	610	620	1005

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	135	95	59	49
Volume Left	16	28	10	10
Volume Right	24	13	24	18
cSH	1535	1469	725	719
Volume to Capacity	0.01	0.02	0.08	0.07
Queue Length 95th (ft)	1	1	7	5
Control Delay (s)	0.9	2.3	10.4	10.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.9	2.3	10.4	10.4
Approach LOS			B	B

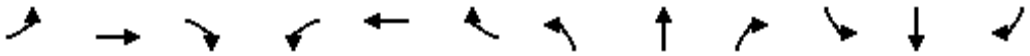
Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	20.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	51	6	4	31	1	5	8	8	4	4	2
Future Volume (vph)	2	51	6	4	31	1	5	8	8	4	4	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	55	7	4	34	1	5	9	9	4	4	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	64	39	23	10
Volume Left (vph)	2	4	5	4
Volume Right (vph)	7	1	9	2
Hadj (s)	-0.03	0.04	-0.16	-0.01
Departure Headway (s)	4.0	4.1	4.0	4.1
Degree Utilization, x	0.07	0.04	0.03	0.01
Capacity (veh/h)	889	871	873	844
Control Delay (s)	7.3	7.3	7.1	7.2
Approach Delay (s)	7.3	7.3	7.1	7.2
Approach LOS	A	A	A	A

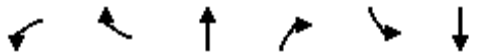
Intersection Summary				
Delay	7.2			
Level of Service	A			
Intersection Capacity Utilization	13.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	100	3	20	46	16	3	43	82	124	8	6
Future Volume (vph)	6	100	3	20	46	16	3	43	82	124	8	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	109	3	22	50	17	3	47	89	135	9	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	119	89	139	151
Volume Left (vph)	7	22	3	135
Volume Right (vph)	3	17	89	7
Hadj (s)	0.03	-0.03	-0.35	0.18
Departure Headway (s)	4.7	4.7	4.3	4.8
Degree Utilization, x	0.16	0.12	0.16	0.20
Capacity (veh/h)	707	707	796	714
Control Delay (s)	8.6	8.3	8.1	8.9
Approach Delay (s)	8.6	8.3	8.1	8.9
Approach LOS	A	A	A	A

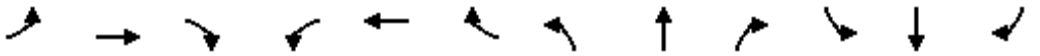
Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	36.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	45	27	11	50	54
Future Volume (vph)	0	45	27	11	50	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	49	29	12	54	59

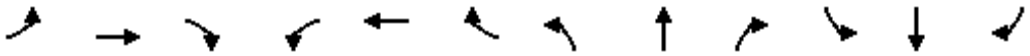
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	49	41	113
Volume Left (vph)	0	0	54
Volume Right (vph)	49	12	0
Hadj (s)	-0.57	-0.14	0.13
Departure Headway (s)	3.7	4.0	4.2
Degree Utilization, x	0.05	0.05	0.13
Capacity (veh/h)	938	881	850
Control Delay (s)	6.9	7.2	7.8
Approach Delay (s)	6.9	7.2	7.8
Approach LOS	A	A	A

Intersection Summary			
Delay	7.4		
Level of Service	A		
Intersection Capacity Utilization	15.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	116	38	231	47	195	28	198	110	166	279	6
Future Volume (vph)	15	116	38	231	47	195	28	198	110	166	279	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.95		1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1555		1788	1794	1770	3741		2006	3998	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1555		1788	1794	1770	3741		2006	3998	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	126	41	251	51	212	30	215	120	180	303	7
RTOR Reduction (vph)	0	0	37	0	0	131	0	59	0	0	1	0
Lane Group Flow (vph)	16	126	4	0	302	81	30	276	0	180	309	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	9.8	9.8	9.8		22.1	38.7	3.2	33.7		16.6	47.1	
Effective Green, g (s)	9.8	9.8	9.8		22.1	38.7	3.2	33.7		16.6	47.1	
Actuated g/C Ratio	0.10	0.10	0.10		0.22	0.38	0.03	0.33		0.16	0.46	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	194	180	150		390	685	55	1244		328	1858	
v/s Ratio Prot	0.01	c0.07			c0.17	0.05	0.02	c0.07		c0.09	0.08	
v/s Ratio Perm			0.00									
v/c Ratio	0.08	0.70	0.03		0.77	0.12	0.55	0.22		0.55	0.17	
Uniform Delay, d1	41.7	44.3	41.4		37.3	20.3	48.3	24.4		38.9	15.7	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	9.2	0.0		9.3	0.1	5.8	0.4		1.9	0.2	
Delay (s)	41.7	53.5	41.5		46.5	20.3	54.1	24.8		40.8	15.9	
Level of Service	D	D	D		D	C	D	C		D	B	
Approach Delay (s)		49.8			35.7			27.2			25.0	
Approach LOS		D			D			C			C	

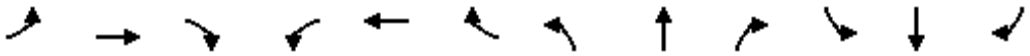
Intersection Summary			
HCM 2000 Control Delay	32.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	101.3	Sum of lost time (s)	19.1
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	389	5	16	579	33	0	0	26	18	0	20
Future Volume (Veh/h)	5	389	5	16	579	33	0	0	26	18	0	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	423	5	17	629	36	0	0	28	20	0	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	665			428			1138	1134	426	1144	1119	647
vC1, stage 1 conf vol							436	436		681	681	
vC2, stage 2 conf vol							703	699		464	438	
vCu, unblocked vol	665			358			1115	1111	355	1121	1094	647
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			100	100	96	94	100	95
cM capacity (veh/h)	924			1127			353	376	646	363	381	471

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	433	682	28	42
Volume Left	5	17	0	20
Volume Right	5	36	28	22
cSH	924	1127	646	413
Volume to Capacity	0.01	0.02	0.04	0.10
Queue Length 95th (ft)	0	1	3	8
Control Delay (s)	0.2	0.4	10.8	14.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	0.4	10.8	14.7
Approach LOS			B	B

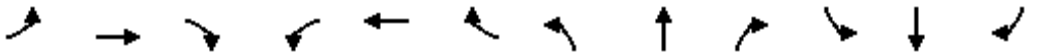
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	481	10	31	758	18	10	4	66	22	4	11
Future Volume (Veh/h)	7	481	10	31	758	18	10	4	66	22	4	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	523	11	34	824	20	11	4	72	24	4	12
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	844			535			1452	1458	530	1515	1453	835
vC1, stage 1 conf vol							546	546		902	902	
vC2, stage 2 conf vol							907	912		613	551	
vCu, unblocked vol	844			494			1450	1456	488	1516	1451	835
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			96	99	87	90	99	97
cM capacity (veh/h)	792			1025			264	292	556	251	293	367

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	8	534	34	844	87	40
Volume Left	8	0	34	0	11	24
Volume Right	0	11	0	20	72	12
cSH	792	1700	1025	1700	470	281
Volume to Capacity	0.01	0.31	0.03	0.50	0.18	0.14
Queue Length 95th (ft)	1	0	3	0	17	12
Control Delay (s)	9.6	0.0	8.6	0.0	14.4	19.9
Lane LOS	A		A		B	C
Approach Delay (s)	0.1		0.3		14.4	19.9
Approach LOS					B	C

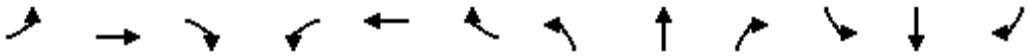
Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	54.6%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	650	0	0	838	106	0	0	0	0	0	18
Future Volume (Veh/h)	22	650	0	0	838	106	0	0	0	0	0	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	707	0	0	911	115	0	0	0	0	0	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1026			707			1686	1781	707	1724	1724	968
vC1, stage 1 conf vol							755	755		968	968	
vC2, stage 2 conf vol							931	1026		755	755	
vCu, unblocked vol	1026			707			1686	1781	707	1724	1724	968
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	100	100	94
cM capacity (veh/h)	677			891			227	240	435	242	263	308

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	24	707	0	1026	0	20
Volume Left	24	0	0	0	0	0
Volume Right	0	0	0	115	0	20
cSH	677	1700	1700	1700	1700	308
Volume to Capacity	0.04	0.42	0.00	0.60	0.00	0.06
Queue Length 95th (ft)	3	0	0	0	0	5
Control Delay (s)	10.5	0.0	0.0	0.0	0.0	17.5
Lane LOS	B				A	C
Approach Delay (s)	0.3		0.0		0.0	17.5
Approach LOS					A	C

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	60.5%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	67	0	0	58	28	270	23	41	612	10
Future Volume (Veh/h)	0	0	67	0	0	58	28	270	23	41	612	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	73	0	0	63	30	293	25	45	665	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1030	1138	670	1194	1132	159	676			318		
vC1, stage 1 conf vol	760	760		366	366							
vC2, stage 2 conf vol	270	378		828	766							
vCu, unblocked vol	1030	1138	670	1194	1132	159	676			318		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	82	100	100	93	97			96		
cM capacity (veh/h)	322	352	399	220	337	858	911			1239		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	73	63	30	195	123	45	676
Volume Left	0	0	30	0	0	45	0
Volume Right	73	63	0	0	25	0	11
cSH	399	858	911	1700	1700	1239	1700
Volume to Capacity	0.18	0.07	0.03	0.11	0.07	0.04	0.40
Queue Length 95th (ft)	17	6	3	0	0	3	0
Control Delay (s)	16.0	9.5	9.1	0.0	0.0	8.0	0.0
Lane LOS	C	A	A			A	
Approach Delay (s)	16.0	9.5	0.8			0.5	
Approach LOS	C	A					

Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	43.6%	ICU Level of Service		A
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	84	15	36	0	48	15	8	0	22	243	6	0	6	238	26
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	93	17	40	0	53	17	9	0	24	269	7	0	7	264	29
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		150			79			300			300	
Entry Volume veh/h		147			77			294			294	
Circulating Flow (Vc), pc/h	324			386			117			94		
Exiting Flow (Vex), pc/h	31			70			371			357		
Capacity (cPCE), pc/h		817			768			1005			1029	
Capacity (c), veh/h		801			753			986			1008	
v/c Ratio (X)		0.18			0.10			0.30			0.29	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.4			5.8			6.7			6.5	
Lane LOS		A			A			A			A	
95% Queue		0.7			0.3			1.3			1.2	
Approach Delay, s/veh	6.4			5.8			6.7			6.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.5						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - West
E/W Street Name	West Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	17	10	14	0	18	10	21	0	14	120	18	0	21	120	16
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	19	11	16	0	20	11	23	0	16	133	20	0	23	133	18
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		46			54			169			174	
Entry Volume veh/h		45			53			166			171	
Circulating Flow (Vc), pc/h	176			168			53			47		
Exiting Flow (Vex), pc/h	54			45			175			169		
Capacity (cPCE), pc/h		948			955			1072			1078	
Capacity (c), veh/h		929			937			1051			1057	
v/c Ratio (X)		0.05			0.06			0.16			0.16	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.3			4.4			4.9			4.9	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.2			0.6			0.6	
Approach Delay, s/veh	4.3			4.4			4.9			4.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	4.7						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Kelly
E/W Street Name	Kelly Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	13	17	11	0	12	10	89	0	4	141	12	0	81	134	27
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	14	19	12	0	13	11	99	0	4	156	13	0	90	149	30
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		45			123			173			269	
Entry Volume veh/h		44			121			170			264	
Circulating Flow (Vc), pc/h	252			174			123			28		
Exiting Flow (Vex), pc/h	122			45			269			174		
Capacity (cPCE), pc/h		878			950			999			1099	
Capacity (c), veh/h		861			931			980			1077	
v/c Ratio (X)		0.05			0.13			0.17			0.24	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.7			5.1			5.3			5.6	
Lane LOS		A			A			A			A	
95% Queue		0.2			0.4			0.6			1.0	
Approach Delay, s/veh	4.7			5.1			5.3			5.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	5.4						A					

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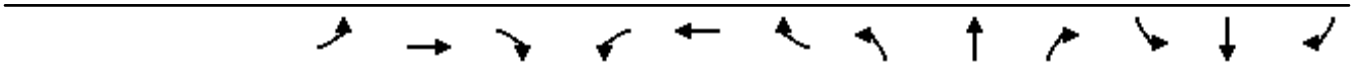


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Future Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				168	0	0	8	72	0	24	801	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				1328	0	593	148	1692	527	148	1178	527
Arrive On Green				0.36	0.00	0.00	0.08	0.32	0.00	0.08	0.32	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				168	0	0	8	72	0	24	801	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Cycle Q Clear(g_c), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				1328	0	593	148	1692	527	148	1178	527
V/C Ratio(X)				0.13	0.00	0.00	0.05	0.04	0.00	0.16	0.68	0.00
Avail Cap(c_a), veh/h				1328	0	593	148	1692	527	148	1178	527
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				10.7	0.0	0.0	21.3	11.7	0.0	21.4	14.8	0.0
Incr Delay (d2), s/veh				0.2	0.0	0.0	0.7	0.0	0.0	2.4	3.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	0.0	0.1	0.2	0.0	0.4	5.3	0.0
LnGrp Delay(d),s/veh				10.9	0.0	0.0	21.9	11.8	0.0	23.8	18.0	0.0
LnGrp LOS				B			C	B		C	B	
Approach Vol, veh/h					168			80			825	
Approach Delay, s/veh					10.9			12.8			18.1	
Approach LOS					B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	20.0			8.0	20.0		22.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	16.0			4.0	16.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	2.5			2.2	11.5		3.5
Green Ext Time (p_c), s	0.0	0.2			0.0	2.2		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	16.6
HCM 2010 LOS	B

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	531	188	479	1082	0	0
Future Volume (veh/h)	531	188	479	1082	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	577	204	521	1176		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1840	823	1074	3313		
Arrive On Green	0.50	0.50	0.30	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	577	204	521	1176		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	3.7	2.8	4.8	1.9		
Cycle Q Clear(g_c), s	3.7	2.8	4.8	1.9		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1840	823	1074	3313		
V/C Ratio(X)	0.31	0.25	0.49	0.35		
Avail Cap(c_a), veh/h	1840	823	1074	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.9	5.7	11.5	0.3		
Incr Delay (d2), s/veh	0.4	0.7	1.6	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.0	1.4	2.5	1.0		
LnGrp Delay(d),s/veh	6.4	6.4	13.0	0.6		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	781			1697		
Approach Delay, s/veh	6.4			4.4		
Approach LOS	A			A		

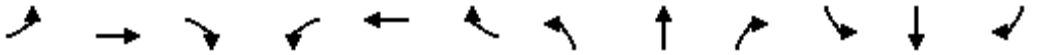
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			16.0	24.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			12.0	20.0				36.0
Max Q Clear Time (g_c+I1), s			6.8	5.7				3.9
Green Ext Time (p_c), s			1.0	4.0				10.8

Intersection Summary	
HCM 2010 Ctrl Delay	5.0
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	640	67	807	1970	67	1
Future Volume (veh/h)	640	67	807	1970	67	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	696	73	877	2141	73	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	982	439	954	2208	492	439
Arrive On Green	0.27	0.27	0.27	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	696	73	877	2141	73	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	10.3	2.0	14.3	33.4	1.8	0.0
Cycle Q Clear(g_c), s	10.3	2.0	14.3	33.4	1.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	982	439	954	2208	492	439
V/C Ratio(X)	0.71	0.17	0.92	0.97	0.15	0.00
Avail Cap(c_a), veh/h	982	439	954	2208	492	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.9	16.9	21.4	11.5	16.8	0.0
Incr Delay (d2), s/veh	4.3	0.8	15.1	13.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	1.0	8.9	20.4	1.0	0.0
LnGrp Delay(d),s/veh	24.2	17.7	36.5	24.7	17.4	0.0
LnGrp LOS	C	B	D	C	B	
Approach Vol, veh/h	769			3018	73	
Approach Delay, s/veh	23.6			28.1	17.4	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		3.8	16.3	12.3				35.4
Green Ext Time (p_c), s		0.1	0.0	1.7				0.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.0
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Future Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	312	3	100	542	0	11	0	121	24	34	35
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1149	11	284	1982	887	0	0	0	568	596	507
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3832	36	1845	3681	1647		0		1845	1937	1647
Grp Volume(v), veh/h	0	154	161	100	542	0		0.0		24	34	35
Grp Sat Flow(s),veh/h/ln	0	1840	1931	1845	1840	1647				1845	1937	1647
Q Serve(g_s), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Cycle Q Clear(g_c), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	566	594	284	1982	887				568	596	507
V/C Ratio(X)	0.00	0.27	0.27	0.35	0.27	0.00				0.04	0.06	0.07
Avail Cap(c_a), veh/h	0	566	594	284	1982	887				568	596	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.6	13.6	19.7	6.5	0.0				12.6	12.7	12.7
Incr Delay (d2), s/veh	0.0	1.2	1.1	3.4	0.3	0.0				0.1	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	1.9	1.5	2.1	0.0				0.3	0.4	0.4
LnGrp Delay(d),s/veh	0.0	14.8	14.7	23.1	6.8	0.0				12.8	12.9	13.0
LnGrp LOS		B	B	C	A					B	B	B
Approach Vol, veh/h		315			642						93	
Approach Delay, s/veh		14.7			9.4						12.9	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			4.5	5.3		2.8		6.1
Green Ext Time (p_c), s			0.1	1.3		0.2		3.7

Intersection Summary	
HCM 2010 Ctrl Delay	11.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Future Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	250	505	5	10	665	386	11	11	21	107	62	62
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	158	960	10	105	841	376	216	216	376	422	203	203
Arrive On Green	0.09	0.26	0.26	0.02	0.08	0.08	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3734	37	1845	3681	1647	945	945	1647	1845	890	890
Grp Volume(v), veh/h	250	249	261	10	665	386	22	0	21	107	0	124
Grp Sat Flow(s),veh/h/ln	1845	1840	1931	1845	1840	1647	1890	0	1647	1845	0	1780
Q Serve(g_s), s	6.0	8.1	8.1	0.4	12.4	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Cycle Q Clear(g_c), s	6.0	8.1	8.1	0.4	12.4	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Prop In Lane	1.00		0.02	1.00		1.00	0.50		1.00	1.00		0.50
Lane Grp Cap(c), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
V/C Ratio(X)	1.58	0.53	0.53	0.09	0.79	1.03	0.05	0.00	0.06	0.25	0.00	0.30
Avail Cap(c_a), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.0	22.3	22.3	32.6	30.7	32.4	21.1	0.0	21.1	22.1	0.0	22.4
Incr Delay (d2), s/veh	289.4	4.1	4.0	1.8	7.5	53.1	0.2	0.0	0.3	1.4	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.7	4.6	4.8	0.2	7.2	12.8	0.4	0.0	0.3	1.9	0.0	2.2
LnGrp Delay(d),s/veh	321.4	26.5	26.3	34.3	38.2	85.4	21.3	0.0	21.4	23.6	0.0	24.3
LnGrp LOS	F	C	C	C	D	F	C		C	C		C
Approach Vol, veh/h		760			1061			43			231	
Approach Delay, s/veh		123.4			55.3			21.3			24.0	
Approach LOS		F			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	10.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.7	2.4	10.1		6.0	8.0	18.0
Green Ext Time (p_c), s		0.1	0.0	1.9		0.7	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	75.9
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	492	362	132	894	400	422	443	376	422	443	376
Arrive On Green	0.02	0.08	0.08	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	2026	1489	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	388	355	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1674	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.1	14.6	14.7	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.1	14.6	14.7	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		0.89	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.87	0.87	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	31.1	31.1	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	19.8	22.1	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	9.9	9.3	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	53.4	50.8	53.2	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	D	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		52.1			43.4			27.3			30.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	16.7		11.8	5.1	17.8
Green Ext Time (p_c), s		1.3	0.0	0.2		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	40.0
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Future Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	93	8	17	71	42	2	5	7	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.8	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	15%	21%	13%
Vol Thru, %	38%	73%	54%
Vol Right, %	46%	6%	33%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	13	118	120
LT Vol	2	25	16
Through Vol	5	86	65
RT Vol	6	7	39
Lane Flow Rate	14	128	130
Geometry Grp	1	1	1
Degree of Util (X)	0.017	0.145	0.141
Departure Headway (Hd)	4.232	4.064	3.887
Convergence, Y/N	Yes	Yes	Yes
Cap	851	881	920
Service Time	2.232	2.093	1.921
HCM Lane V/C Ratio	0.016	0.145	0.141
HCM Control Delay	7.3	7.8	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.5

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Future Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	161	75	54	64	0	0	0	0	18	0	60

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	-	0	0	161	0	0	333	333	64
Stage 1	-	-	-	-	-	-	172	172	-
Stage 2	-	-	-	-	-	-	161	161	-
Critical Hdwy	-	-	-	4.12	-	-	6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-	3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1418	-	0	662	587	1000
Stage 1	0	-	-	-	-	0	858	756	-
Stage 2	0	-	-	-	-	0	868	765	-
Platoon blocked, %		-	-		-				
Mov Cap-1 Maneuver	-	-	-	1418	-	-	636	0	1000
Mov Cap-2 Maneuver	-	-	-	-	-	-	636	0	-
Stage 1	-	-	-	-	-	-	825	0	-
Stage 2	-	-	-	-	-	-	868	0	-

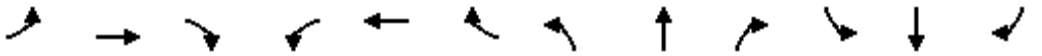
Approach	EB	WB	SB
HCM Control Delay, s	0	3.5	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1418	-	636	1000
HCM Lane V/C Ratio	-	-	0.038	-	0.029	0.06
HCM Control Delay (s)	-	-	7.6	0	10.8	8.8
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	518	201	1018	1229	17	967
Future Volume (veh/h)	518	201	1018	1229	17	967
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	563	0	1107	1336	18	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	883	395	1384	1317	394	618
Arrive On Green	0.24	0.00	0.39	0.68	0.21	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	563	0	1107	1336	18	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	10.3	0.0	20.6	51.0	0.6	0.0
Cycle Q Clear(g_c), s	10.3	0.0	20.6	51.0	0.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	883	395	1384	1317	394	618
V/C Ratio(X)	0.64	0.00	0.80	1.01	0.05	0.00
Avail Cap(c_a), veh/h	883	395	1384	1317	394	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.6	0.0	20.4	12.0	23.4	0.0
Incr Delay (d2), s/veh	3.5	0.0	4.9	28.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	11.1	36.7	0.3	0.0
LnGrp Delay(d),s/veh	29.1	0.0	25.4	40.4	23.7	0.0
LnGrp LOS	C		C	F	C	
Approach Vol, veh/h	563			2443	18	
Approach Delay, s/veh	29.1			33.6	23.7	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	33.0	22.0				55.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	29.0	18.0				51.0
Max Q Clear Time (g_c+I1), s		2.6	22.6	12.3				53.0
Green Ext Time (p_c), s		0.0	2.6	1.8				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	32.7
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	273	107	194	477	306	1676	214	38	179	121	74	78
Future Volume (vph)	273	107	194	477	306	1676	214	38	179	121	74	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3018	1441		1787	1583		1807	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3018	1441		1787	1583		1807	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	297	116	211	518	333	1822	233	41	195	132	80	85
RTOR Reduction (vph)	0	0	189	0	477	481	0	0	122	0	0	73
Lane Group Flow (vph)	297	116	22	518	767	430	0	274	73	0	212	12
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	17.0	9.6	9.6	34.2	28.4	28.4		16.3	16.3		13.1	13.1
Effective Green, g (s)	17.0	9.6	9.6	34.2	28.4	28.4		16.3	16.3		13.1	13.1
Actuated g/C Ratio	0.19	0.10	0.10	0.37	0.31	0.31		0.18	0.18		0.14	0.14
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	328	195	166	661	936	447		318	281		258	226
v/s Ratio Prot	c0.17	0.06		0.29	0.25			c0.15			c0.12	
v/s Ratio Perm			0.01			c0.30			0.05			0.01
v/c Ratio	0.91	0.59	0.13	0.78	0.97dr	0.96		0.86	0.26		0.82	0.05
Uniform Delay, d1	36.5	39.1	37.2	25.4	29.2	31.0		36.5	32.4		38.1	33.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	27.0	3.2	0.1	6.1	7.9	34.2		20.0	0.2		17.8	0.0
Delay (s)	63.5	42.3	37.3	31.4	37.1	65.2		56.5	32.6		55.9	33.9
Level of Service	E	D	D	C	D	E		E	C		E	C
Approach Delay (s)		50.7			45.6			46.5			49.6	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	46.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	91.5	Sum of lost time (s)	18.3
Intersection Capacity Utilization	109.1%	ICU Level of Service	H
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	669	0	323	0	0	437	681	0	557	561	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	0	0	0	0	742	0	351	0	0	484	755	0	618	622	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929		4.2929	4.1129			4.1129		4.2929	4.1129	
Follow-Up Headway (sec)		3.1858		3.1858	3.1858			3.1858		3.1858	3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		0		0	742	351		484	755	618	622	
Entry Volume veh/h		0		0	727	351		475	740	606	610	
Circulating Flow (Vc), pc/h	1982			484			618			742		
Exiting Flow (Vex), pc/h	618			0			484			1364		
Capacity (cPCE), pc/h		156		786	805			733		648	672	
Capacity (c), veh/h		153		771	789			719		635	659	
v/c Ratio (X)		0.00		0.00	0.92			0.66		0.95	0.93	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.6		4.7	38.4	0.0		17.5	0.0	50.5	43.8	
Lane LOS		C		A	E	A		C	A	F	E	
95% Queue		0.0		0.0	13.1			5.0		13.4	12.4	
Approach Delay, s/veh				25.9			6.8			47.2		
Approach LOS				D			A			E		
Intersection Delay, s/veh / LOS	26.7						D					

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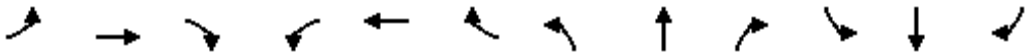
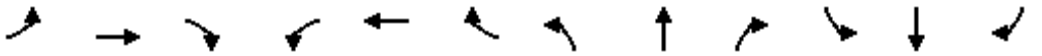


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	21	11	91	36	158	17	102	95	182	139	12
Future Volume (vph)	0	21	11	91	36	158	17	102	95	182	139	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	12	99	39	172	18	111	103	198	151	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	35	310	232	362
Volume Left (vph)	0	99	18	198
Volume Right (vph)	12	172	103	13
Hadj (s)	-0.17	-0.24	-0.22	0.12
Departure Headway (s)	5.9	5.3	5.2	5.4
Degree Utilization, x	0.06	0.46	0.34	0.54
Capacity (veh/h)	496	629	630	640
Control Delay (s)	9.3	12.7	10.9	14.4
Approach Delay (s)	9.3	12.7	10.9	14.4
Approach LOS	A	B	B	B

Intersection Summary				
Delay	12.8			
Level of Service	B			
Intersection Capacity Utilization	63.5%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	251	80	104	17	70	42	73	731	26	67	739	181
Future Volume (vph)	251	80	104	17	70	42	73	731	26	67	739	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1795	1583		1769		1770	1853		1770	1863	1583
Flt Permitted		0.70	1.00		0.95		0.14	1.00		0.13	1.00	1.00
Satd. Flow (perm)		1304	1583		1685		256	1853		249	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	273	87	113	18	76	46	79	795	28	73	803	197
RTOR Reduction (vph)	0	0	72	0	29	0	0	2	0	0	0	91
Lane Group Flow (vph)	0	360	41	0	111	0	79	821	0	73	803	106
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		21.7	21.7		21.7		31.1	31.1		32.3	32.3	32.3
Effective Green, g (s)		21.7	21.7		21.7		31.1	31.1		32.3	32.3	32.3
Actuated g/C Ratio		0.36	0.36		0.36		0.52	0.52		0.54	0.54	0.54
Clearance Time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		7.0	7.0	7.0
Lane Grp Cap (vph)		471	572		609		132	960		134	1002	852
v/s Ratio Prot								c0.44			0.43	
v/s Ratio Perm		c0.28	0.03		0.07		0.31			0.29		0.07
v/c Ratio		0.76	0.07		0.18		0.60	0.86		0.54	0.80	0.12
Uniform Delay, d1		16.9	12.5		13.1		10.1	12.5		9.0	11.2	6.9
Progression Factor		1.00	1.00		1.00		1.03	0.95		1.00	1.00	1.00
Incremental Delay, d2		10.0	0.2		0.5		16.4	8.6		15.0	6.7	0.3
Delay (s)		26.9	12.7		13.6		26.7	20.4		24.0	18.0	7.2
Level of Service		C	B		B		C	C		C	B	A
Approach Delay (s)		23.5			13.6			21.0			16.4	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Civic Center Drive
E/W Street Name	Civic Center Drive
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	37	40	34	0	37	47	79	0	28	732	68	0	44	764	31
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	41	44	38	0	41	52	88	0	31	812	75	0	49	847	34
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		123			181			918			930	
Entry Volume veh/h		121			177			900			912	
Circulating Flow (Vc), pc/h	937			884			134			124		
Exiting Flow (Vex), pc/h	168			117			941			926		
Capacity (cPCE), pc/h		443			467			988			998	
Capacity (c), veh/h		434			458			969			979	
v/c Ratio (X)		0.28			0.39			0.93			0.93	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.8			14.7			34.9			35.1	
Lane LOS		B			B			D			E	
95% Queue		1.1			1.8			14.6			14.8	
Approach Delay, s/veh	12.8			14.7			34.9			35.1		
Approach LOS	B			B			D			E		
Intersection Delay, s/veh / LOS	32.0						D					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/12/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	48	38	53	0	23	38	64	0	40	717	53	0	29	717	90
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	53	42	59	0	26	42	71	0	44	795	59	0	32	795	100
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		154			139			898			927	
Entry Volume veh/h		151			136			880			909	
Circulating Flow (Vc), pc/h	853			892			127			112		
Exiting Flow (Vex), pc/h	133			186			919			880		
Capacity (cPCE), pc/h		482			463			995			1010	
Capacity (c), veh/h		472			454			976			990	
v/c Ratio (X)		0.32			0.30			0.90			0.92	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.8			12.8			30.7			32.6	
Lane LOS		B			B			D			D	
95% Queue		1.4			1.2			13.2			14.1	
Approach Delay, s/veh	12.8			12.8			30.7			32.6		
Approach LOS	B			B			D			D		
Intersection Delay, s/veh / LOS	29.1						D					

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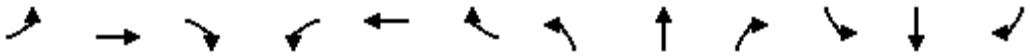


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	8	114	55	8	13	39	393	26	13	354	12
Future Volume (vph)	14	8	114	55	8	13	39	393	26	13	354	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	9	124	60	9	14	42	427	28	14	385	13

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	24	124	83	256	242	207	206
Volume Left (vph)	15	0	60	42	0	14	0
Volume Right (vph)	0	124	14	0	28	0	13
Hadj (s)	0.35	-0.67	0.08	0.12	-0.05	0.07	-0.01
Departure Headway (s)	7.2	6.2	6.9	5.9	5.7	6.0	5.9
Degree Utilization, x	0.05	0.21	0.16	0.42	0.39	0.34	0.34
Capacity (veh/h)	459	533	477	591	607	581	589
Control Delay (s)	9.3	9.6	11.2	11.9	11.1	10.8	10.6
Approach Delay (s)	9.6		11.2	11.5		10.7	
Approach LOS	A		B	B		B	

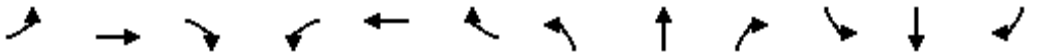
Intersection Summary				
Delay	11.0			
Level of Service	B			
Intersection Capacity Utilization	44.3%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	293	100	180	204	73	211
Future Volume (vph)	293	100	180	204	73	211
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	318	109	196	222	79	229

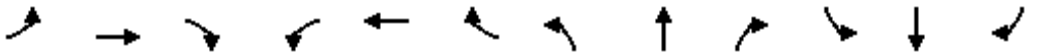
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	318	109	418	308
Volume Left (vph)	318	0	0	79
Volume Right (vph)	0	109	222	0
Hadj (s)	0.53	-0.67	-0.28	0.09
Departure Headway (s)	7.0	5.8	5.5	6.0
Degree Utilization, x	0.62	0.18	0.64	0.52
Capacity (veh/h)	482	588	626	569
Control Delay (s)	19.8	8.9	17.8	15.3
Approach Delay (s)	17.0		17.8	15.3
Approach LOS	C		C	C

Intersection Summary			
Delay	16.8		
Level of Service	C		
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	0	346	90	311	90	0	0	0	0	135	96
Future Volume (vph)	46	0	346	90	311	90	0	0	0	0	135	96
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.94	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3420						3319	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3420						3319	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	50	0	376	98	338	98	0	0	0	0	147	104
RTOR Reduction (vph)	0	0	309	71	48	0	0	0	0	0	84	0
Lane Group Flow (vph)	50	0	67	27	388	0	0	0	0	0	167	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	6.8		6.8	10.5	10.5						7.3	
Effective Green, g (s)	6.8		6.8	10.5	10.5						7.3	
Actuated g/C Ratio	0.18		0.18	0.28	0.28						0.19	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	315		497	487	942						635	
v/s Ratio Prot	c0.03		0.02	0.02	c0.11						c0.05	
v/s Ratio Perm												
v/c Ratio	0.16		0.14	0.06	0.41						0.26	
Uniform Delay, d1	13.2		13.2	10.2	11.3						13.1	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.2		0.1	0.0	0.3						0.2	
Delay (s)	13.5		13.3	10.2	11.6						13.3	
Level of Service	B		B	B	B						B	
Approach Delay (s)		13.3			11.3			0.0			13.3	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	38.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	210	436	77	278	745	0	0	625	197
Future Volume (vph)	0	0	0	210	436	77	278	745	0	0	625	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.96
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1515	1770	1863			1760	1451
Flt Permitted				0.95	1.00	1.00	0.12	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1515	231	1863			1760	1451
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	228	474	84	302	810	0	0	679	214
RTOR Reduction (vph)	0	0	0	0	0	66	0	0	0	0	1	48
Lane Group Flow (vph)	0	0	0	228	474	18	302	810	0	0	699	145
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.1	18.1	18.1	57.4	57.4			37.1	37.1
Effective Green, g (s)				18.1	18.1	18.1	57.4	57.4			37.1	37.1
Actuated g/C Ratio				0.21	0.21	0.21	0.67	0.67			0.43	0.43
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				374	749	320	430	1250			763	629
v/s Ratio Prot				0.13	c0.13		0.13	c0.43			c0.40	
v/s Ratio Perm						0.01	0.35					0.10
v/c Ratio				0.61	0.63	0.06	0.70	0.65			0.92	0.23
Uniform Delay, d1				30.5	30.7	26.9	25.1	8.2			22.7	15.2
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				7.2	4.0	0.3	5.5	1.3			15.8	0.3
Delay (s)				37.7	34.7	27.2	30.6	9.5			38.6	15.5
Level of Service				D	C	C	C	A			D	B
Approach Delay (s)		0.0			34.8			15.2			33.6	
Approach LOS		A			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	85.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	151	0	134	744	292	16	82	322	406	54	22
Future Volume (vph)	19	151	0	134	744	292	16	82	322	406	54	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	4.0		4.6	4.0	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539		1770	3539	1583		1848	1583	1681	1688	
Flt Permitted	0.29	1.00		0.65	1.00	1.00		0.93	1.00	0.69	0.73	
Satd. Flow (perm)	533	3539		1207	3539	1583		1739	1583	1219	1272	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	164	0	146	809	317	17	89	350	441	59	24
RTOR Reduction (vph)	0	0	0	0	0	317	0	0	350	0	7	0
Lane Group Flow (vph)	21	164	0	146	809	0	0	106	0	256	261	0
Turn Type	Perm	NA		Perm	NA	NA	Perm	NA	NA	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.2	17.2		16.8	16.8	0.0		16.2	0.0	16.2	16.2	
Effective Green, g (s)	17.2	17.2		16.8	16.8	0.0		16.2	0.0	16.2	16.2	
Actuated g/C Ratio	0.40	0.40		0.39	0.39	0.00		0.38	0.00	0.38	0.38	
Clearance Time (s)	4.6	4.6		5.0	5.0			4.6		4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5			4.0		4.0	4.0	
Lane Grp Cap (vph)	215	1428		476	1395	0		661	0	463	483	
v/s Ratio Prot		0.05			c0.23							
v/s Ratio Perm	0.04			0.12				0.06		c0.21	0.21	
v/c Ratio	0.10	0.11		0.31	0.58	0.00		0.16	0.00	0.55	0.54	
Uniform Delay, d1	7.9	7.9		8.9	10.1	21.3		8.7	21.3	10.4	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.0		0.4	0.6	0.0		0.2	0.0	1.8	1.6	
Delay (s)	8.2	8.0		9.3	10.8	21.3		8.9	21.3	12.1	11.8	
Level of Service	A	A		A	B	C		A	C	B	B	
Approach Delay (s)		8.0			13.2			18.4			12.0	
Approach LOS		A			B			B			B	

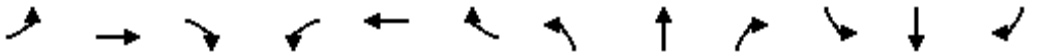
Intersection Summary			
HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	42.6	Sum of lost time (s)	9.6
Intersection Capacity Utilization	55.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	321	16	24	66	25	30
Future Volume (Veh/h)	321	16	24	66	25	30
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	349	17	26	72	27	33
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			366		482	358
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			366		482	358
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		95	95
cM capacity (veh/h)			1193		532	687

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	366	98	60
Volume Left	0	26	27
Volume Right	17	0	33
cSH	1700	1193	607
Volume to Capacity	0.22	0.02	0.10
Queue Length 95th (ft)	0	2	8
Control Delay (s)	0.0	2.3	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	2.3	11.6
Approach LOS			B

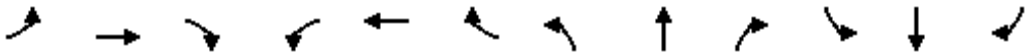
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	34.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	355	221	226	0	0	0	94	507	160	170	435	116
Future Volume (vph)	355	221	226	0	0	0	94	507	160	170	435	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.94				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1493				1770	1863	1552	1770	1863	1516
Flt Permitted	0.95	1.00	1.00				0.49	1.00	1.00	0.19	1.00	1.00
Satd. Flow (perm)	1770	1863	1493				917	1863	1552	347	1863	1516
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	386	240	246	0	0	0	102	551	174	185	473	126
RTOR Reduction (vph)	0	0	166	0	0	0	0	0	91	0	0	59
Lane Group Flow (vph)	386	240	80	0	0	0	102	551	83	185	473	67
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	19.5	19.5	19.5				22.7	22.7	22.7	31.7	31.7	31.7
Effective Green, g (s)	19.5	19.5	19.5				22.7	22.7	22.7	31.7	31.7	31.7
Actuated g/C Ratio	0.32	0.32	0.32				0.38	0.38	0.38	0.53	0.53	0.53
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	575	605	485				346	704	587	301	984	800
v/s Ratio Prot	c0.22	0.13						c0.30		c0.05	0.25	
v/s Ratio Perm			0.05				0.11		0.05	0.27		0.04
v/c Ratio	0.67	0.40	0.16				0.29	0.78	0.14	0.61	0.48	0.08
Uniform Delay, d1	17.5	15.7	14.4				13.0	16.5	12.3	10.1	8.9	7.0
Progression Factor	1.00	1.00	1.00				1.07	1.07	1.64	1.00	1.00	1.00
Incremental Delay, d2	6.1	1.9	0.7				1.9	7.4	0.4	3.7	1.7	0.2
Delay (s)	23.6	17.6	15.2				15.9	25.1	20.5	13.8	10.6	7.2
Level of Service	C	B	B				B	C	C	B	B	A
Approach Delay (s)		19.6			0.0			23.0			10.8	
Approach LOS		B			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		

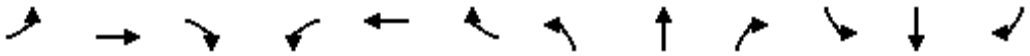
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	588	36	0	0	0	0	10	36	29	27	0
Future Volume (Veh/h)	16	588	36	0	0	0	0	10	36	29	27	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	639	39	0	0	0	0	11	39	32	29	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			678			707	692	339	398	712	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			678			707	692	339	398	712	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	93	92	100
cM capacity (veh/h)	1622			910			300	362	657	489	352	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	336	358	50	61
Volume Left	17	0	0	32
Volume Right	0	39	39	0
cSH	1622	1700	557	413
Volume to Capacity	0.01	0.21	0.09	0.15
Queue Length 95th (ft)	1	0	7	13
Control Delay (s)	0.5	0.0	12.1	15.2
Lane LOS	A		B	C
Approach Delay (s)	0.2		12.1	15.2
Approach LOS			B	C

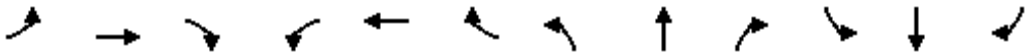
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	34.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Future Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	42	1388	28	0	0	0	0	14	36	64	52	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	736	722	50	116
Volume Left (vph)	42	0	0	64
Volume Right (vph)	0	28	36	0
Hadj (s)	0.06	0.01	-0.40	0.14
Departure Headway (s)	5.1	5.0	5.6	6.0
Degree Utilization, x	1.00	1.00	0.08	0.19
Capacity (veh/h)	736	722	628	586
Control Delay (s)	54.7	54.4	9.1	10.4
Approach Delay (s)	54.5		9.1	10.4
Approach LOS	F		A	B

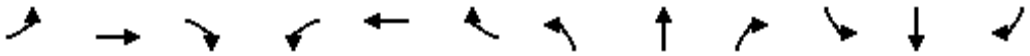
Intersection Summary				
Delay	50.0			
Level of Service	E			
Intersection Capacity Utilization	56.4%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	291	524	13	43	0	21	0	19	12	0	0	0
Future Volume (vph)	291	524	13	43	0	21	0	19	12	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	316	570	14	47	0	23	0	21	13	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	316	584	70	34
Volume Left (vph)	316	0	47	0
Volume Right (vph)	0	14	23	13
Hadj (s)	0.53	0.02	-0.03	-0.20
Departure Headway (s)	5.2	4.7	4.8	5.4
Degree Utilization, x	0.46	0.76	0.09	0.05
Capacity (veh/h)	689	758	732	622
Control Delay (s)	11.3	19.5	8.3	8.7
Approach Delay (s)	16.6		8.3	8.7
Approach LOS	C		A	A

Intersection Summary				
Delay	15.8			
Level of Service	C			
Intersection Capacity Utilization	45.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	39	0	0	51	17	549	74	37	503	18
Future Volume (Veh/h)	0	0	39	0	0	51	17	549	74	37	503	18
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	42	0	0	55	18	597	80	40	547	20
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked	0.85	0.85	0.84	0.85	0.85	0.98	0.84			0.98		
vC, conflicting volume	1332	1364	564	1349	1334	644	574			684		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1247	1284	390	1267	1249	625	402			666		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	88	98			96		
cM capacity (veh/h)	106	130	552	107	137	471	970			896		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	42	55	18	677	40	567
Volume Left	0	0	18	0	40	0
Volume Right	42	55	0	80	0	20
cSH	552	471	970	1700	896	1700
Volume to Capacity	0.08	0.12	0.02	0.40	0.04	0.33
Queue Length 95th (ft)	6	10	1	0	3	0
Control Delay (s)	12.1	13.7	8.8	0.0	9.2	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.1	13.7	0.2		0.6	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	43.5%	ICU Level of Service		A
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	0	71	0	64	14	12	0	46	540	19	0	24	490	61
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	16	0	79	0	71	16	13	0	51	599	21	0	27	543	68
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		95			100			671			638	
Entry Volume veh/h		93			98			658			625	
Circulating Flow (Vc), pc/h	641			666			43			138		
Exiting Flow (Vex), pc/h	48			135			628			693		
Capacity (cPCE), pc/h		595			581			1082			984	
Capacity (c), veh/h		584			569			1061			965	
v/c Ratio (X)		0.16			0.17			0.62			0.65	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.1			8.5			11.9			13.6	
Lane LOS		A			A			B			B	
95% Queue		0.6			0.6			4.5			4.9	
Approach Delay, s/veh	8.1			8.5			11.9			13.6		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh / LOS	12.1						B					

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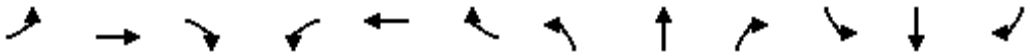
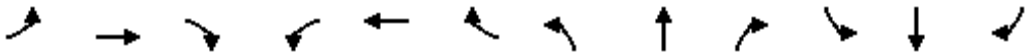


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	46	78	26	87	6	135	4	257	70	161	158	2
Future Volume (vph)	46	78	26	87	6	135	4	257	70	161	158	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	85	28	95	7	147	4	279	76	175	172	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	163	249	359	349
Volume Left (vph)	50	95	4	175
Volume Right (vph)	28	147	76	2
Hadj (s)	-0.01	-0.24	-0.09	0.13
Departure Headway (s)	6.6	6.2	5.9	6.1
Degree Utilization, x	0.30	0.43	0.59	0.59
Capacity (veh/h)	458	509	573	549
Control Delay (s)	12.5	13.7	16.8	17.5
Approach Delay (s)	12.5	13.7	16.8	17.5
Approach LOS	B	B	C	C

Intersection Summary				
Delay	15.7			
Level of Service	C			
Intersection Capacity Utilization	64.7%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	332	43	19	231	35	41	63	65	28	83	14
Future Volume (Veh/h)	12	332	43	19	231	35	41	63	65	28	83	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	361	47	21	251	38	45	68	71	30	90	15
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	303			415			790	762	392	842	767	285
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	303			415			790	762	392	842	767	285
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			80	79	89	85	72	98
cM capacity (veh/h)	1243			1137			226	319	653	202	317	745

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	421	310	184	135
Volume Left	13	21	45	30
Volume Right	47	38	71	15
cSH	1243	1137	353	299
Volume to Capacity	0.01	0.02	0.52	0.45
Queue Length 95th (ft)	1	1	72	56
Control Delay (s)	0.4	0.7	25.7	26.6
Lane LOS	A	A	D	D
Approach Delay (s)	0.4	0.7	25.7	26.6
Approach LOS			D	D

Intersection Summary				
Average Delay	8.3			
Intersection Capacity Utilization	43.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	99	130	175	0	126	105	22	0	153	529	138	0	24	529	49
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	110	144	194	0	140	116	24	0	170	586	153	0	27	586	54
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		448			280			909			667	
Entry Volume veh/h		439			275			891			654	
Circulating Flow (Vc), pc/h		753			866			281			426	
Exiting Flow (Vex), pc/h		324			340			720			920	
Capacity (cPCE), pc/h		532			475			853			738	
Capacity (c), veh/h		522			466			836			724	
v/c Ratio (X)		0.84			0.59			1.07			0.90	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		37.8			21.2			71.8			37.8	
Lane LOS		E			C			F			E	
95% Queue		8.7			3.7			22.0			11.9	
Approach Delay, s/veh	37.8			21.2			71.8			37.8		
Approach LOS	E			C			F			E		
Intersection Delay, s/veh / LOS	49.2						E					

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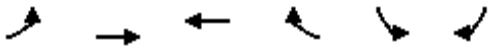
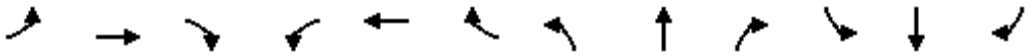


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	460	342	24	36	38
Future Volume (Veh/h)	9	460	342	24	36	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	500	372	26	39	41
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	406				914	394
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	406				914	394
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				87	94
cM capacity (veh/h)	1145				298	650

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	510	398	80
Volume Left	10	0	39
Volume Right	0	26	41
cSH	1145	1700	413
Volume to Capacity	0.01	0.23	0.19
Queue Length 95th (ft)	1	0	18
Control Delay (s)	0.3	0.0	15.8
Lane LOS	A		C
Approach Delay (s)	0.3	0.0	15.8
Approach LOS			C

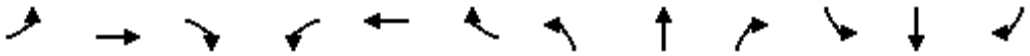
Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	42.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	474	4	2	316	29	2	1	3	44	0	35
Future Volume (Veh/h)	26	474	4	2	316	29	2	1	3	44	0	35
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	515	4	2	343	32	2	1	3	48	0	38
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	377			519			976	954	517	942	940	363
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	377			519			976	954	517	942	940	363
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			99	100	99	80	100	94
cM capacity (veh/h)	1180			1047			213	252	558	236	256	680

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	547	377	6	86
Volume Left	28	2	2	48
Volume Right	4	32	3	38
cSH	1180	1047	320	331
Volume to Capacity	0.02	0.00	0.02	0.26
Queue Length 95th (ft)	2	0	1	25
Control Delay (s)	0.7	0.1	16.5	19.6
Lane LOS	A	A	C	C
Approach Delay (s)	0.7	0.1	16.5	19.6
Approach LOS			C	C

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	58.2%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	272	285	82	196	0	170	0	114	0	0	0
Future Volume (vph)	0	272	285	82	196	0	170	0	114	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	296	310	89	213	0	185	0	124	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	606	302	309	0
Volume Left (vph)	0	89	185	0
Volume Right (vph)	310	0	124	0
Hadj (s)	-0.27	0.09	-0.09	0.00
Departure Headway (s)	5.2	6.0	6.2	7.2
Degree Utilization, x	0.87	0.50	0.53	0.00
Capacity (veh/h)	606	569	551	900
Control Delay (s)	33.1	14.8	15.9	10.2
Approach Delay (s)	33.1	14.8	15.9	0.0
Approach LOS	D	B	C	A

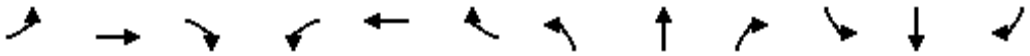
Intersection Summary				
Delay		24.2		
Level of Service		C		
Intersection Capacity Utilization		79.2%	ICU Level of Service	D
Analysis Period (min)		15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	64	131	185	94	94	180
Future Volume (vph)	64	131	185	94	94	180
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	70	142	201	102	102	196

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	212	303	298
Volume Left (vph)	70	0	102
Volume Right (vph)	142	102	0
Hadj (s)	-0.30	-0.17	0.10
Departure Headway (s)	5.0	4.7	4.9
Degree Utilization, x	0.30	0.39	0.41
Capacity (veh/h)	653	733	694
Control Delay (s)	10.1	10.7	11.3
Approach Delay (s)	10.1	10.7	11.3
Approach LOS	B	B	B

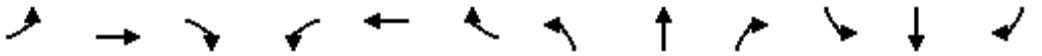
Intersection Summary			
Delay	10.8		
Level of Service	B		
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	375	22	20	310	69	30	42	40	75	26	21
Future Volume (Veh/h)	14	375	22	20	310	69	30	42	40	75	26	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	408	24	22	337	75	33	46	43	82	28	23
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.88						0.88	0.88		0.88	0.88	0.88
vC, conflicting volume	415			443			920	920	439	946	894	382
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	266			443			841	840	439	869	811	228
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			84	82	93	55	89	97
cM capacity (veh/h)	1138			1107			212	253	608	183	263	709

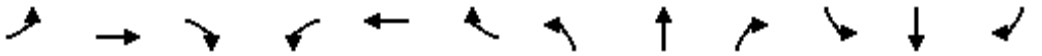
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	447	434	122	133
Volume Left	15	22	33	82
Volume Right	24	75	43	23
cSH	1138	1107	299	227
Volume to Capacity	0.01	0.02	0.41	0.59
Queue Length 95th (ft)	1	2	48	83
Control Delay (s)	0.4	0.6	25.1	41.1
Lane LOS	A	A	D	E
Approach Delay (s)	0.4	0.6	25.1	41.1
Approach LOS			D	E

Intersection Summary				
Average Delay	7.9			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			



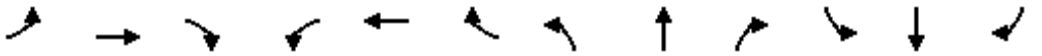
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	230	90	252	223	211	94	577	162	217	490	30
Future Volume (vph)	58	230	90	252	223	211	94	577	162	217	490	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	10	11	11	16	16	16
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844	1534	1681	1761	1794	1652	3295		2006	2093	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1844	1534	1681	1761	1794	1652	3295		2006	2093	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	63	250	98	274	242	229	102	627	176	236	533	33
RTOR Reduction (vph)	0	0	79	0	0	187	0	28	0	0	3	0
Lane Group Flow (vph)	0	313	19	247	269	42	102	775	0	236	563	0
Confl. Peds. (#/hr)			10	10					3			
Confl. Bikes (#/hr)			4						3			
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		17.4	17.4	16.4	16.4	16.4	6.8	25.6		11.8	30.6	
Effective Green, g (s)		17.4	17.4	16.4	16.4	16.4	6.8	25.6		11.8	30.6	
Actuated g/C Ratio		0.19	0.19	0.18	0.18	0.18	0.08	0.28		0.13	0.34	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		356	296	306	320	326	124	937		263	711	
v/s Ratio Prot		c0.17		0.15	c0.15		0.06	c0.24		0.12	c0.27	
v/s Ratio Perm			0.01			0.02						
v/c Ratio		0.88	0.06	0.81	0.84	0.13	0.82	0.83		0.90	0.79	
Uniform Delay, d1		35.3	29.6	35.3	35.5	30.8	41.0	30.1		38.5	26.8	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		20.5	0.0	14.7	18.1	0.2	32.4	8.3		29.9	8.8	
Delay (s)		55.8	29.7	50.0	53.6	31.0	73.4	38.4		68.4	35.7	
Level of Service		E	C	D	D	C	E	D		E	D	
Approach Delay (s)		49.5			45.5			42.4			45.3	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	45.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



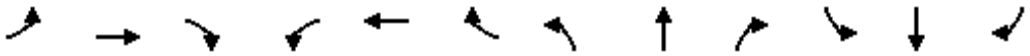
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	646	6	22	718	196	9	18	58	366	14	90
Future Volume (vph)	45	646	6	22	718	196	9	18	58	366	14	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3533		1761	3415			3131			1776	1524
Flt Permitted	0.19	1.00		0.28	1.00			0.92			0.66	1.00
Satd. Flow (perm)	350	3533		521	3415			2885			1235	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	702	7	24	780	213	10	20	63	398	15	98
RTOR Reduction (vph)	0	1	0	0	44	0	0	32	0	0	0	40
Lane Group Flow (vph)	49	708	0	24	949	0	0	61	0	0	413	58
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	21.3	21.3		21.3	21.3			29.2			29.2	29.2
Effective Green, g (s)	21.3	21.3		21.3	21.3			29.2			29.2	29.2
Actuated g/C Ratio	0.36	0.36		0.36	0.36			0.49			0.49	0.49
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	124	1254		184	1212			1404			601	741
v/s Ratio Prot		0.20			c0.28							
v/s Ratio Perm	0.14			0.05				0.02			c0.33	0.04
v/c Ratio	0.40	0.56		0.13	0.78			0.04			0.69	0.08
Uniform Delay, d1	14.5	15.6		13.1	17.3			8.1			11.9	8.2
Progression Factor	1.02	1.08		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.7	0.2		0.3	3.4			0.1			6.3	0.2
Delay (s)	15.4	17.0		13.4	20.7			8.1			18.2	8.4
Level of Service	B	B		B	C			A			B	A
Approach Delay (s)		16.9			20.5			8.1			16.3	
Approach LOS		B			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	15	15	50	15	167	20	737	91	213	768	18
Future Volume (vph)	40	15	15	50	15	167	20	737	91	213	768	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	10	11	16
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1752			1789	1794	1770	3933		1652	3409	
Flt Permitted		0.78			0.81	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1412			1504	1794	1770	3933		1652	3409	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	16	16	54	16	182	22	801	99	232	835	20
RTOR Reduction (vph)	0	12	0	0	0	158	0	11	0	0	1	0
Lane Group Flow (vph)	0	63	0	0	70	24	22	889	0	232	854	0
Confl. Peds. (#/hr)			4	4					3			
Confl. Bikes (#/hr)			1						2			
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		8.4			8.4	8.4	1.3	28.0		13.1	39.8	
Effective Green, g (s)		8.4			8.4	8.4	1.3	28.0		13.1	39.8	
Actuated g/C Ratio		0.13			0.13	0.13	0.02	0.44		0.21	0.63	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		187			199	238	36	1742		342	2146	
v/s Ratio Prot							0.01	c0.23		c0.14	0.25	
v/s Ratio Perm		0.04			c0.05	0.01						
v/c Ratio		0.34			0.35	0.10	0.61	0.51		0.68	0.40	
Uniform Delay, d1		24.9			24.9	24.1	30.7	12.7		23.1	5.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4			0.4	0.1	27.0	0.3		5.3	0.1	
Delay (s)		25.3			25.3	24.2	57.7	12.9		28.4	5.9	
Level of Service		C			C	C	E	B		C	A	
Approach Delay (s)		25.3			24.5			14.0			10.7	
Approach LOS		C			C			B			B	

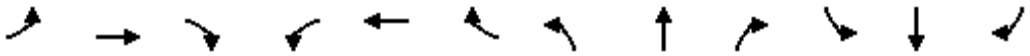
Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	63.2	Sum of lost time (s)	13.7
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	292	31	34	177	0	69	0	59	0	0	0
Future Volume (Veh/h)	0	292	31	34	177	0	69	0	59	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	317	34	37	192	0	75	0	64	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	192			351			600	600	334	664	617	192
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	192			351			600	600	334	664	617	192
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			81	100	91	100	100	100
cM capacity (veh/h)	1381			1208			403	402	708	332	393	850

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	351	229	139	0
Volume Left	0	37	75	0
Volume Right	34	0	64	0
cSH	1381	1208	503	1700
Volume to Capacity	0.00	0.03	0.28	0.00
Queue Length 95th (ft)	0	2	28	0
Control Delay (s)	0.0	1.5	14.9	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	1.5	14.9	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	45.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	169	38	0	65	0	38	1	12	0	0	0
Future Volume (Veh/h)	0	169	38	0	65	0	38	1	12	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	184	41	0	71	0	41	1	13	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	71			225			276	276	204	289	296	71
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	71			225			276	276	204	289	296	71
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			94	100	98	100	100	100
cM capacity (veh/h)	1529			1344			677	632	836	652	616	991

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	225	71	55	0
Volume Left	0	0	41	0
Volume Right	41	0	13	0
cSH	1529	1344	708	1700
Volume to Capacity	0.00	0.00	0.08	0.00
Queue Length 95th (ft)	0	0	6	0
Control Delay (s)	0.0	0.0	10.5	0.0
Lane LOS			B	A
Approach Delay (s)	0.0	0.0	10.5	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	21.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	82	248	26	47	296	26
Future Volume (vph)	82	248	26	47	296	26
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	270	28	51	322	28

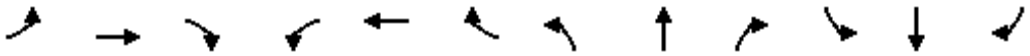
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	359	79	350
Volume Left (vph)	89	0	322
Volume Right (vph)	270	51	0
Hadj (s)	-0.37	-0.35	0.22
Departure Headway (s)	4.6	4.9	5.1
Degree Utilization, x	0.46	0.11	0.50
Capacity (veh/h)	731	659	668
Control Delay (s)	11.6	8.5	13.1
Approach Delay (s)	11.6	8.5	13.1
Approach LOS	B	A	B

Intersection Summary			
Delay	12.0		
Level of Service	B		
Intersection Capacity Utilization	50.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	203	103	14	159	14	140	17	18	4	12	21
Future Volume (Veh/h)	9	203	103	14	159	14	140	17	18	4	12	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	221	112	15	173	15	152	18	20	4	13	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	188			333			537	515	277	536	564	180
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	188			333			537	515	277	536	564	180
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			64	96	97	99	97	97
cM capacity (veh/h)	1386			1226			426	455	762	423	427	862

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	343	203	190	40
Volume Left	10	15	152	4
Volume Right	112	15	20	23
cSH	1386	1226	449	601
Volume to Capacity	0.01	0.01	0.42	0.07
Queue Length 95th (ft)	1	1	52	5
Control Delay (s)	0.3	0.7	18.7	11.4
Lane LOS	A	A	C	B
Approach Delay (s)	0.3	0.7	18.7	11.4
Approach LOS			C	B

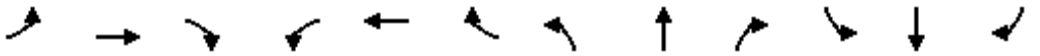
Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	42.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	227	3	9	189	4	2	2	8	2	1	1
Future Volume (Veh/h)	1	227	3	9	189	4	2	2	8	2	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	247	3	10	205	4	2	2	9	2	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	209			250			479	480	248	488	479	207
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	209			250			479	480	248	488	479	207
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			100	100	99	100	100	100
cM capacity (veh/h)	1362			1316			492	481	790	480	482	833

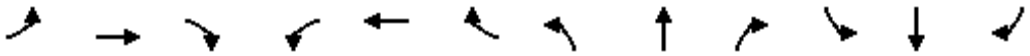
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	251	219	13	4
Volume Left	1	10	2	2
Volume Right	3	4	9	1
cSH	1362	1316	663	538
Volume to Capacity	0.00	0.01	0.02	0.01
Queue Length 95th (ft)	0	1	1	1
Control Delay (s)	0.0	0.4	10.5	11.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.0	0.4	10.5	11.7
Approach LOS			B	B

Intersection Summary				
Average Delay	0.6			
Intersection Capacity Utilization	26.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	133	122	68	76	24	134	719	78	97	571	47
Future Volume (vph)	116	133	122	68	76	24	134	719	78	97	571	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.96			0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1753			1791		1770	3487		1770	3499	
Flt Permitted		0.83			0.65		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1476			1194		1770	3487		1770	3499	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	145	133	74	83	26	146	782	85	105	621	51
RTOR Reduction (vph)	0	25	0	0	9	0	0	12	0	0	9	0
Lane Group Flow (vph)	0	379	0	0	174	0	146	855	0	105	663	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		19.0			18.6		17.9	28.0		8.1	18.0	
Effective Green, g (s)		19.0			18.6		17.9	28.0		8.1	18.0	
Actuated g/C Ratio		0.28			0.27		0.26	0.41		0.12	0.26	
Clearance Time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		408			323		461	1421		208	916	
v/s Ratio Prot							0.08	c0.25		0.06	c0.19	
v/s Ratio Perm		c0.26			0.15							
v/c Ratio		0.93			0.54		0.32	0.60		0.50	0.72	
Uniform Delay, d1		24.2			21.4		20.5	16.0		28.4	23.1	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		27.1			2.0		0.1	1.9		1.9	5.0	
Delay (s)		51.2			23.3		20.6	17.9		30.3	28.0	
Level of Service		D			C		C	B		C	C	
Approach Delay (s)		51.2			23.3			18.3			28.4	
Approach LOS		D			C			B			C	

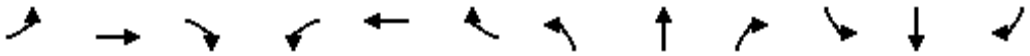
Intersection Summary			
HCM 2000 Control Delay	27.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	68.7	Sum of lost time (s)	14.2
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	22	167	58	56	75	12	67	69	26	19	27	22
Future Volume (Veh/h)	22	167	58	56	75	12	67	69	26	19	27	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	182	63	61	82	13	73	75	28	21	29	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	95			245			510	478	214	538	504	88
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	95			245			510	478	214	538	504	88
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			95			83	84	97	94	93	98
cM capacity (veh/h)	1499			1321			418	456	827	366	442	970

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	269	156	176	74
Volume Left	24	61	73	21
Volume Right	63	13	28	24
cSH	1499	1321	472	501
Volume to Capacity	0.02	0.05	0.37	0.15
Queue Length 95th (ft)	1	4	43	13
Control Delay (s)	0.8	3.3	17.1	13.4
Lane LOS	A	A	C	B
Approach Delay (s)	0.8	3.3	17.1	13.4
Approach LOS			C	B

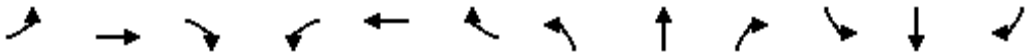
Intersection Summary				
Average Delay	7.0			
Intersection Capacity Utilization	42.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	85	11	13	40	2	14	24	13	3	11	5
Future Volume (vph)	7	85	11	13	40	2	14	24	13	3	11	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	92	12	14	43	2	15	26	14	3	12	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	112	59	55	20
Volume Left (vph)	8	14	15	3
Volume Right (vph)	12	2	14	5
Hadj (s)	-0.02	0.06	-0.06	-0.09
Departure Headway (s)	4.1	4.2	4.2	4.2
Degree Utilization, x	0.13	0.07	0.06	0.02
Capacity (veh/h)	854	827	809	808
Control Delay (s)	7.7	7.6	7.5	7.3
Approach Delay (s)	7.7	7.6	7.5	7.3
Approach LOS	A	A	A	A

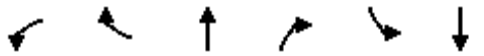
Intersection Summary				
Delay	7.6			
Level of Service	A			
Intersection Capacity Utilization	18.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	19	154	12	64	66	44	12	104	144	84	22	5
Future Volume (vph)	19	154	12	64	66	44	12	104	144	84	22	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	167	13	70	72	48	13	113	157	91	24	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	201	190	283	120
Volume Left (vph)	21	70	13	91
Volume Right (vph)	13	48	157	5
Hadj (s)	0.02	-0.04	-0.29	0.16
Departure Headway (s)	5.3	5.2	4.9	5.6
Degree Utilization, x	0.29	0.28	0.38	0.19
Capacity (veh/h)	626	630	682	586
Control Delay (s)	10.5	10.2	10.9	9.8
Approach Delay (s)	10.5	10.2	10.9	9.8
Approach LOS	B	B	B	A

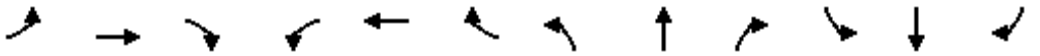
Intersection Summary				
Delay	10.5			
Level of Service	B			
Intersection Capacity Utilization	54.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	98	113	7	64	43
Future Volume (vph)	0	98	113	7	64	43
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	107	123	8	70	47

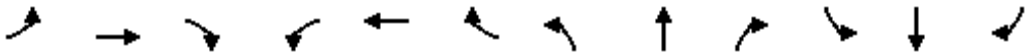
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	107	131	117
Volume Left (vph)	0	0	70
Volume Right (vph)	107	8	0
Hadj (s)	-0.57	0.00	0.15
Departure Headway (s)	3.9	4.2	4.4
Degree Utilization, x	0.12	0.15	0.14
Capacity (veh/h)	871	817	781
Control Delay (s)	7.4	8.0	8.2
Approach Delay (s)	7.4	8.0	8.2
Approach LOS	A	A	A

Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	19.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	147	48	216	117	369	54	691	286	309	581	26
Future Volume (vph)	22	147	48	216	117	369	54	691	286	309	581	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1557		1804	1794	1770	3792		2006	3986	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1557		1804	1794	1770	3792		2006	3986	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	160	52	235	127	401	59	751	311	336	632	28
RTOR Reduction (vph)	0	0	46	0	0	242	0	49	0	0	3	0
Lane Group Flow (vph)	24	160	6	0	362	159	59	1013	0	336	657	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	10.0	10.0	10.0		19.2	32.9	5.1	21.2		13.7	29.8	
Effective Green, g (s)	10.0	10.0	10.0		19.2	32.9	5.1	21.2		13.7	29.8	
Actuated g/C Ratio	0.12	0.12	0.12		0.23	0.40	0.06	0.25		0.16	0.36	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	241	223	187		416	709	108	966		330	1427	
v/s Ratio Prot	0.01	c0.09			c0.20	0.09	0.03	c0.27		c0.17	0.16	
v/s Ratio Perm			0.00									
v/c Ratio	0.10	0.72	0.03		0.87	0.22	0.55	1.05		1.02	0.46	
Uniform Delay, d1	32.6	35.2	32.3		30.8	16.7	37.9	31.0		34.8	20.5	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	8.8	0.0		17.6	0.2	3.0	42.5		54.2	0.2	
Delay (s)	32.7	44.1	32.4		48.4	16.8	40.9	73.5		89.0	20.8	
Level of Service	C	D	C		D	B	D	E		F	C	
Approach Delay (s)		40.3			31.8			71.8			43.8	
Approach LOS		D			C			E			D	

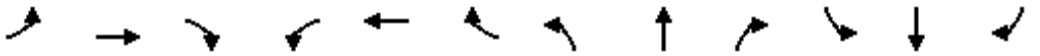
Intersection Summary			
HCM 2000 Control Delay	50.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	83.2	Sum of lost time (s)	19.1
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	801	31	42	770	52	21	0	42	24	13	53
Future Volume (Veh/h)	9	801	31	42	770	52	21	0	42	24	13	53
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	871	34	46	837	57	23	0	46	26	14	58
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.92			0.92	0.92	0.92	0.92	0.92	
vC, conflicting volume	894			905			1930	1894	888	1912	1882	866
vC1, stage 1 conf vol							908	908		958	958	
vC2, stage 2 conf vol							1022	986		954	925	
vCu, unblocked vol	894			854			1967	1928	836	1947	1915	866
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			94			86	100	86	85	93	84
cM capacity (veh/h)	759			724			168	223	338	170	214	353

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	915	940	69	98
Volume Left	10	46	23	26
Volume Right	34	57	46	58
cSH	759	724	253	256
Volume to Capacity	0.01	0.06	0.27	0.38
Queue Length 95th (ft)	1	5	27	43
Control Delay (s)	0.4	1.8	24.5	27.5
Lane LOS	A	A	C	D
Approach Delay (s)	0.4	1.8	24.5	27.5
Approach LOS			C	D

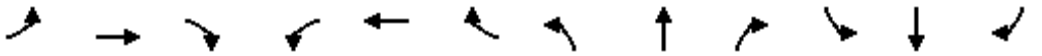
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	1116	26	61	1097	61	5	4	97	24	4	15
Future Volume (Veh/h)	9	1116	26	61	1097	61	5	4	97	24	4	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	1213	28	66	1192	66	5	4	105	26	4	16
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	1258			1242			2591	2638	1228	2697	2619	1226
vC1, stage 1 conf vol							1248	1248		1357	1357	
vC2, stage 2 conf vol							1343	1390		1340	1262	
vCu, unblocked vol	1258			1228			2651	2700	1213	2762	2680	1226
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			88			95	97	50	0	97	93
cM capacity (veh/h)	553			538			109	134	210	20	119	218

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	10	1241	66	1258	114	46
Volume Left	10	0	66	0	5	26
Volume Right	0	28	0	66	105	16
cSH	553	1700	538	1700	198	33
Volume to Capacity	0.02	0.73	0.12	0.74	0.58	1.38
Queue Length 95th (ft)	1	0	10	0	78	126
Control Delay (s)	11.6	0.0	12.6	0.0	45.3	472.7
Lane LOS	B		B		E	F
Approach Delay (s)	0.1		0.6		45.3	472.7
Approach LOS					E	F

Intersection Summary			
Average Delay	10.2		
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	1215	0	0	1250	329	0	0	0	0	0	22
Future Volume (Veh/h)	13	1215	0	0	1250	329	0	0	0	0	0	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	1321	0	0	1359	358	0	0	0	0	0	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1717			1321			2732	3066	1321	2887	2887	1538
vC1, stage 1 conf vol							1349	1349		1538	1538	
vC2, stage 2 conf vol							1383	1717		1349	1349	
vCu, unblocked vol	1717			1321			2732	3066	1321	2887	2887	1538
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	100	100	83
cM capacity (veh/h)	369			523			102	106	191	107	130	142

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	14	1321	0	1717	0	24
Volume Left	14	0	0	0	0	0
Volume Right	0	0	0	358	0	24
cSH	369	1700	1700	1700	1700	142
Volume to Capacity	0.04	0.78	0.00	1.01	0.00	0.17
Queue Length 95th (ft)	3	0	0	0	0	15
Control Delay (s)	15.2	0.0	0.0	0.0	0.0	35.3
Lane LOS	C				A	E
Approach Delay (s)	0.2		0.0		0.0	35.3
Approach LOS					A	E

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	95.8%	ICU Level of Service		F
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	83	0	0	104	87	878	23	104	704	8
Future Volume (Veh/h)	0	0	83	0	0	104	87	878	23	104	704	8
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	90	0	0	113	95	954	25	113	765	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1776	2164	770	2238	2156	490	774			979		
vC1, stage 1 conf vol	996	996		1156	1156							
vC2, stage 2 conf vol	780	1169		1081	1000							
vCu, unblocked vol	1776	2164	770	2238	2156	490	774			979		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	74	100	100	78	89			84		
cM capacity (veh/h)	115	111	344	47	140	524	837			701		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	90	113	95	636	343	113	774
Volume Left	0	0	95	0	0	113	0
Volume Right	90	113	0	0	25	0	9
cSH	344	524	837	1700	1700	701	1700
Volume to Capacity	0.26	0.22	0.11	0.37	0.20	0.16	0.46
Queue Length 95th (ft)	26	20	10	0	0	14	0
Control Delay (s)	19.2	13.7	9.8	0.0	0.0	11.1	0.0
Lane LOS	C	B	A			B	
Approach Delay (s)	19.2	13.7	0.9			1.4	
Approach LOS	C	B					

Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	185	91	77	0	52	12	25	0	25	557	44	0	19	557	47
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	205	101	85	0	58	13	28	0	28	618	49	0	21	618	52
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		391			99			695			691	
Entry Volume veh/h		383			97			681			677	
Circulating Flow (Vc), pc/h	697			851			327			99		
Exiting Flow (Vex), pc/h	171			93			851			761		
Capacity (cPCE), pc/h		563			483			815			1024	
Capacity (c), veh/h		552			473			799			1003	
v/c Ratio (X)		0.69			0.21			0.85			0.68	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.5			10.6			28.8			14.1	
Lane LOS		C			B			D			B	
95% Queue		5.4			0.8			10.2			5.5	
Approach Delay, s/veh	23.5			10.6			28.8			14.1		
Approach LOS	C			B			D			B		
Intersection Delay, s/veh / LOS	21.3						C					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - West
E/W Street Name	West Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	34	20	29	0	37	20	43	0	29	246	37	0	43	245	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	38	22	32	0	41	22	48	0	32	273	41	0	48	272	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		92			111			346			358	
Entry Volume veh/h		90			109			339			351	
Circulating Flow (Vc), pc/h	361			343			108			95		
Exiting Flow (Vex), pc/h	111			92			359			345		
Capacity (cPCE), pc/h		788			802			1014			1028	
Capacity (c), veh/h		772			786			994			1007	
v/c Ratio (X)		0.12			0.14			0.34			0.35	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.9			6.0			7.2			7.2	
Lane LOS		A			A			A			A	
95% Queue		0.4			0.5			1.5			1.6	
Approach Delay, s/veh	5.9			6.0			7.2			7.2		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	6.9						A					

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HCS 2010 Roundabout Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Period	PM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Kelly Street
E/W Street Name	Kelly Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustment and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	39	16	13	0	8	6	151	0	3	315	8	0	141	305	59
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (vPCE) pc/h	0	43	18	14	0	9	7	167	0	3	349	9	0	156	338	65
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (sec)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (sec)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (Ve), pc/h		75			183			361			559	
Entry Volume veh/h		74			179			354			548	
Circulating Flow (Vc), pc/h	503			395			217			19		
Exiting Flow (Vex), pc/h	183			75			559			361		
Capacity (cPCE), pc/h		683			761			910			1109	
Capacity (c), veh/h		670			746			892			1087	
v/c Ratio (X)		0.11			0.24			0.40			0.50	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Movement	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.6			7.5			8.7			9.2	
Lane LOS		A			A			A			A	
95% Queue		0.4			0.9			1.9			2.9	
Approach Delay, s/veh	6.6			7.5			8.7			9.2		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh / LOS	8.6						A					

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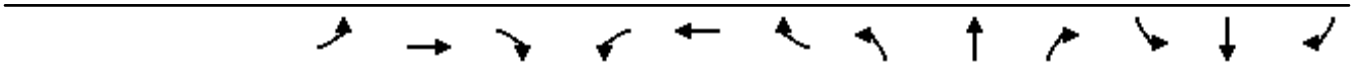


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Future Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				112	0	0	14	1151	0	26	2405	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				738	0	329	92	3173	988	92	2208	988
Arrive On Green				0.20	0.00	0.00	0.05	0.60	0.00	0.05	0.60	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				112	0	0	14	1151	0	26	2405	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Cycle Q Clear(g_c), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				738	0	329	92	3173	988	92	2208	988
V/C Ratio(X)				0.15	0.00	0.00	0.15	0.36	0.00	0.28	1.09	0.00
Avail Cap(c_a), veh/h				738	0	329	92	3173	988	92	2208	988
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				26.4	0.0	0.0	36.4	8.2	0.0	36.6	16.0	0.0
Incr Delay (d2), s/veh				0.4	0.0	0.0	3.5	0.3	0.0	7.5	48.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.0	0.4	4.4	0.0	0.7	38.7	0.0
LnGrp Delay(d),s/veh				26.8	0.0	0.0	39.8	8.5	0.0	44.1	64.3	0.0
LnGrp LOS				C			D	A		D	F	
Approach Vol, veh/h					112			1165			2431	
Approach Delay, s/veh					26.8			8.9			64.1	
Approach LOS					C			A			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	52.0			8.0	52.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	48.0			4.0	48.0		16.0
Max Q Clear Time (g_c+I1), s	3.1	10.9			2.6	50.0		4.0
Green Ext Time (p_c), s	0.0	10.6			0.0	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1123	209	317	1287	0	0
Future Volume (veh/h)	1123	209	317	1287	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	1221	227	345	1399		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	2116	947	805	3313		
Arrive On Green	0.57	0.57	0.22	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	1221	227	345	1399		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	8.4	2.7	3.3	2.5		
Cycle Q Clear(g_c), s	8.4	2.7	3.3	2.5		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2116	947	805	3313		
V/C Ratio(X)	0.58	0.24	0.43	0.42		
Avail Cap(c_a), veh/h	2116	947	805	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.4	4.2	13.3	0.3		
Incr Delay (d2), s/veh	1.2	0.6	1.7	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.4	1.4	1.8	1.2		
LnGrp Delay(d),s/veh	6.6	4.8	15.0	0.7		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1448			1744		
Approach Delay, s/veh	6.3			3.5		
Approach LOS	A			A		

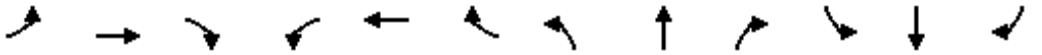
Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			13.0	27.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			9.0	23.0				36.0
Max Q Clear Time (g_c+I1), s			5.3	10.4				4.5
Green Ext Time (p_c), s			0.5	7.5				13.7

Intersection Summary	
HCM 2010 Ctrl Delay	4.8
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1740	97	305	1324	156	0
Future Volume (veh/h)	1740	97	305	1324	156	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1891	105	332	1439	170	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1840	823	358	2419	422	376
Arrive On Green	0.50	0.50	0.10	0.66	0.23	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	1891	105	332	1439	170	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	35.0	2.4	6.4	15.4	5.5	0.0
Cycle Q Clear(g_c), s	35.0	2.4	6.4	15.4	5.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1840	823	358	2419	422	376
V/C Ratio(X)	1.03	0.13	0.93	0.59	0.40	0.00
Avail Cap(c_a), veh/h	1840	823	358	2419	422	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.5	9.3	31.2	6.8	22.9	0.0
Incr Delay (d2), s/veh	28.3	0.3	32.3	1.1	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	24.9	1.2	4.8	8.0	3.1	0.0
LnGrp Delay(d),s/veh	45.8	9.7	63.6	7.8	25.8	0.0
LnGrp LOS	F	A	E	A	C	
Approach Vol, veh/h	1996			1771	170	
Approach Delay, s/veh	43.9			18.3	25.8	
Approach LOS	D			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	11.0	39.0				50.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	7.0	35.0				46.0
Max Q Clear Time (g_c+I1), s		7.5	8.4	37.0				17.4
Green Ext Time (p_c), s		0.3	0.0	0.0				13.6

Intersection Summary	
HCM 2010 Ctrl Delay	31.6
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Future Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	680	7	89	633	0	5	0	34	90	0	53
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1244	13	217	1949	872	0	0	0	1158	0	517
Arrive On Green	0.00	0.33	0.33	0.12	0.53	0.00	0.00	0.00	0.00	0.31	0.00	0.31
Sat Flow, veh/h	0	3829	38	1845	3681	1647		0		3690	0	1647
Grp Volume(v), veh/h	0	335	352	89	633	0		0.0		90	0	53
Grp Sat Flow(s),veh/h/ln	0	1840	1930	1845	1840	1647				1845	0	1647
Q Serve(g_s), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Cycle Q Clear(g_c), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	613	643	217	1949	872				1158	0	517
V/C Ratio(X)	0.00	0.55	0.55	0.41	0.32	0.00				0.08	0.00	0.10
Avail Cap(c_a), veh/h	0	613	643	217	1949	872				1158	0	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.9	13.9	20.9	6.8	0.0				12.3	0.0	12.4
Incr Delay (d2), s/veh	0.0	3.5	3.3	5.6	0.4	0.0				0.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.4	4.6	1.5	2.6	0.0				0.5	0.0	0.6
LnGrp Delay(d),s/veh	0.0	17.3	17.2	26.5	7.3	0.0				12.4	0.0	12.8
LnGrp LOS		B	B	C	A					B		B
Approach Vol, veh/h		687			722						143	
Approach Delay, s/veh		17.3			9.6						12.6	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			10.0	21.0		20.0		31.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			6.0	17.0		16.0		27.0
Max Q Clear Time (g_c+I1), s			4.3	9.6		3.2		7.0
Green Ext Time (p_c), s			0.0	2.5		0.3		4.3

Intersection Summary	
HCM 2010 Ctrl Delay	13.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Future Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	195	751	10	30	1102	325	10	2	16	202	169	79
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	1209	16	115	1058	473	329	66	350	369	250	117
Arrive On Green	0.10	0.32	0.32	0.06	0.29	0.29	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1845	3719	50	1845	3681	1647	1550	310	1647	1845	1250	584
Grp Volume(v), veh/h	195	372	389	30	1102	325	12	0	16	202	0	248
Grp Sat Flow(s),veh/h/ln	1845	1840	1929	1845	1840	1647	1860	0	1647	1845	0	1834
Q Serve(g_s), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Cycle Q Clear(g_c), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Prop In Lane	1.00		0.03	1.00		1.00	0.83		1.00	1.00		0.32
Lane Grp Cap(c), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
V/C Ratio(X)	1.06	0.62	0.62	0.26	1.04	0.69	0.03	0.00	0.05	0.55	0.00	0.68
Avail Cap(c_a), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	22.8	22.8	35.7	28.5	25.3	25.0	0.0	25.0	28.7	0.0	29.6
Incr Delay (d2), s/veh	82.1	4.8	4.6	5.4	39.0	7.9	0.1	0.0	0.2	5.7	0.0	9.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	7.7	8.0	0.8	17.3	7.4	0.2	0.0	0.3	4.6	0.0	6.0
LnGrp Delay(d),s/veh	118.1	27.6	27.4	41.1	67.5	33.2	25.1	0.0	25.3	34.5	0.0	39.2
LnGrp LOS	F	C	C	D	F	C	C		C	C		D
Approach Vol, veh/h		956			1457			28			450	
Approach Delay, s/veh		46.0			59.3			25.2			37.1	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	30.0		20.0	12.0	27.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	26.0		16.0	8.0	23.0
Max Q Clear Time (g_c+I1), s		2.6	3.2	15.7		12.0	10.0	25.0
Green Ext Time (p_c), s		0.0	0.0	3.5		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	51.1
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Future Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	838	272	98	1080	483	394	413	351	394	413	351
Arrive On Green	0.07	0.31	0.31	0.05	0.29	0.29	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1845	2732	888	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	66	634	617	96	832	201	250	306	153	368	411	424
Grp Sat Flow(s),veh/h/ln	1845	1840	1780	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Cycle Q Clear(g_c), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Prop In Lane	1.00		0.50	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
V/C Ratio(X)	0.54	1.12	1.13	0.98	0.77	0.42	0.64	0.74	0.44	0.93	0.99	1.21
Avail Cap(c_a), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.9	26.0	26.0	35.5	24.2	21.3	26.8	27.6	25.6	29.0	29.5	29.5
Incr Delay (d2), s/veh	15.8	76.4	79.7	84.3	5.3	2.6	7.6	11.3	3.9	31.6	42.9	116.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	23.6	23.3	4.3	8.7	3.7	5.6	7.2	3.1	10.9	13.4	18.6
LnGrp Delay(d),s/veh	49.6	102.4	105.7	119.7	29.5	24.0	34.5	38.9	29.5	60.6	72.4	146.4
LnGrp LOS	D	F	F	F	C	C	C	D	C	E	E	F
Approach Vol, veh/h		1317			1129			709			1203	
Approach Delay, s/veh		101.3			36.2			35.3			94.9	
Approach LOS		F			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	27.0		20.0	9.0	26.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	23.0		16.0	5.0	22.0
Max Q Clear Time (g_c+I1), s		13.1	5.9	25.0		18.0	4.6	17.5
Green Ext Time (p_c), s		1.0	0.0	0.0		0.0	0.0	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	71.9
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Future Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	85	8	8	93	10	4	5	9	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	24%	21%	7%
Vol Thru, %	29%	72%	84%
Vol Right, %	47%	6%	9%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	17	108	102
LT Vol	4	23	7
Through Vol	5	78	86
RT Vol	8	7	9
Lane Flow Rate	18	117	111
Geometry Grp	1	1	1
Degree of Util (X)	0.021	0.132	0.124
Departure Headway (Hd)	4.088	4.052	4.014
Convergence, Y/N	Yes	Yes	Yes
Cap	860	884	891
Service Time	2.187	2.083	2.047
HCM Lane V/C Ratio	0.021	0.132	0.125
HCM Control Delay	7.3	7.7	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.4

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Future Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	212	60	34	38	0	0	0	0	30	0	50

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	212	0	0			318	318	38
Stage 1	-	-	-	-	-	-			106	106	-
Stage 2	-	-	-	-	-	-			212	212	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1358	-	0			675	598	1034
Stage 1	0	-	-	-	-	0			918	807	-
Stage 2	0	-	-	-	-	0			823	727	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1358	-	-			657	0	1034
Mov Cap-2 Maneuver	-	-	-	-	-	-			657	0	-
Stage 1	-	-	-	-	-	-			894	0	-
Stage 2	-	-	-	-	-	-			823	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	3.6	9.5
HCM LOS			A

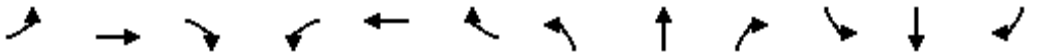
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1358	-	657	1034
HCM Lane V/C Ratio	-	-	0.025	-	0.046	0.048
HCM Control Delay (s)	-	-	7.7	0	10.7	8.7
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	945	137	935	1632	56	1428
Future Volume (veh/h)	945	137	935	1632	56	1428
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1027	0	1016	1774	61	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1302	583	1211	1401	397	624
Arrive On Green	0.35	0.00	0.34	0.72	0.22	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	1027	0	1016	1774	61	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	32.5	0.0	34.1	94.0	3.5	0.0
Cycle Q Clear(g_c), s	32.5	0.0	34.1	94.0	3.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1302	583	1211	1401	397	624
V/C Ratio(X)	0.79	0.00	0.84	1.27	0.15	0.00
Avail Cap(c_a), veh/h	1302	583	1211	1401	397	624
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.6	0.0	39.7	18.0	41.4	0.0
Incr Delay (d2), s/veh	4.9	0.0	7.0	125.7	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.4	0.0	18.0	98.3	1.9	0.0
LnGrp Delay(d),s/veh	42.5	0.0	46.8	143.7	42.2	0.0
LnGrp LOS	D		D	F	D	
Approach Vol, veh/h	1027			2790	61	
Approach Delay, s/veh	42.5			108.4	42.2	
Approach LOS	D			F	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		32.0	48.0	50.0				98.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		28.0	44.0	46.0				94.0
Max Q Clear Time (g_c+I1), s		5.5	36.1	34.5				96.0
Green Ext Time (p_c), s		0.1	2.8	5.5				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	89.9
HCM 2010 LOS	F

Appendix L.2 – Analysis Output Sheets (Future with Project Alternative 2 Existing SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	81	61	94	302	563	169	18	141	82	23	69
Future Volume (vph)	89	81	61	94	302	563	169	18	141	82	23	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3145	1441		1782	1583		1793	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3145	1441		1782	1583		1793	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	88	66	102	328	612	184	20	153	89	25	75
RTOR Reduction (vph)	0	0	58	0	226	253	0	0	91	0	0	57
Lane Group Flow (vph)	97	88	8	102	408	53	0	204	62	0	114	18
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Effective Green, g (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Actuated g/C Ratio	0.07	0.11	0.11	0.11	0.17	0.17		0.29	0.29		0.23	0.23
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	132	212	180	199	546	250		518	460		419	369
v/s Ratio Prot	0.05	0.05		c0.06	c0.13			c0.11			c0.06	
v/s Ratio Perm			0.00			0.04			0.04			0.01
v/c Ratio	0.73	0.42	0.04	0.51	0.75	0.21		0.39	0.13		0.27	0.05
Uniform Delay, d1	33.3	30.3	29.0	30.7	28.9	26.1		20.9	19.3		23.1	21.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	19.0	0.5	0.0	2.2	4.9	0.2		2.2	0.6		1.6	0.2
Delay (s)	52.3	30.8	29.1	33.0	33.8	26.2		23.1	19.9		24.7	22.1
Level of Service	D	C	C	C	C	C		C	B		C	C
Approach Delay (s)		38.7			31.5			21.7			23.7	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	18.3
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	409	0	381	0	0	179	464	0	121	166	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	0	0	0	0	453	0	414	0	0	198	514	0	134	184	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929		4.6453	4.3276			4.3276		4.6453	4.3276	
Follow-Up Headway (s)		3.1858		2.6667	2.5352			2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		0		0	453	414		198	514	134	184	
Entry Volume veh/h		0		0	444	414		194	504	131	180	
Circulating Flow (v_c), pc/h	771			198			134			453		
Exiting Flow (v_{ex}), pc/h	134			0			198			637		
Capacity (c_{pce}), pc/h		523		1125	1200			1267		890	966	
Capacity (c), veh/h		512		1103	1177			1242		872	947	
v/c Ratio (x)		0.00		0.00	0.38			0.16		0.15	0.19	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.0		3.3	6.8	0.0		4.2	0.0	5.6	5.6	
Lane LOS		A		A	A	A		A	A	A	A	
95% Queue, veh		0.0		0.0	1.8			0.6		0.5	0.7	
Approach Delay, s/veh				3.5			1.2			5.6		
Approach LOS				A			A			A		
Intersection Delay, s/veh | LOS	3.0						A					

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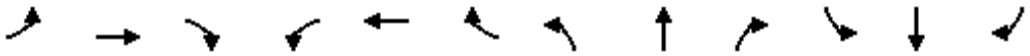

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	21	4	43	27	84	12	58	62	125	79	6
Future Volume (vph)	2	21	4	43	27	84	12	58	62	125	79	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	23	4	47	29	91	13	63	67	136	86	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	29	167	143	229
Volume Left (vph)	2	47	13	136
Volume Right (vph)	4	91	67	7
Hadj (s)	-0.03	-0.24	-0.23	0.13
Departure Headway (s)	5.0	4.6	4.4	4.7
Degree Utilization, x	0.04	0.21	0.18	0.30
Capacity (veh/h)	650	726	767	732
Control Delay (s)	8.2	8.8	8.4	9.7
Approach Delay (s)	8.2	8.8	8.4	9.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	40.4%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Surfrider Way
E/W Street Name	Surfrider Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1
Lane Assignment			LTR				LTR				LTR		LT		R	
Volume (V), veh/h	0	11	8	17	0	2	13	3	0	13	331	2	0	2	360	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	12	9	19	0	2	14	3	0	14	367	2	0	2	399	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929		4.5436	4.5436	
Follow-Up Headway (s)		3.1858			3.1858			3.1858		2.5352	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		40			19			383		401	38	
Entry Volume veh/h		39			19			375		393	37	
Circulating Flow (v_c), pc/h	403			393			23			30		
Exiting Flow (v_{ex}), pc/h	13			66			382			420		
Capacity (c_{pce}), pc/h		755			763			1104		1382	1382	
Capacity (c), veh/h		740			748			1083		1355	1355	
v/c Ratio (x)		0.05			0.02			0.35		0.29	0.03	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.4			5.1			6.8		5.2	2.9	
Lane LOS		A			A			A		A	A	
95% Queue, veh		0.2			0.1			1.6		1.2	0.1	
Approach Delay, s/veh	5.4			5.1			6.8			5.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.8						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Civic Center Drive
Agency or Co.	IBI Group	E/W Street Name	Civic Center Drive
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	12	9	8	0	22	13	21	0	7	280	27	0	60	333	12
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	13	10	9	0	24	14	23	0	8	310	30	0	67	369	13
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		32			61			348			449	
Entry Volume veh/h		31			60			341			440	
Circulating Flow (v_c), pc/h	460			331			90			46		
Exiting Flow (v_{ex}), pc/h	107			35			346			402		
Capacity (c_{pce}), pc/h		713			812			1033			1079	
Capacity (c), veh/h		699			796			1013			1058	
v/c Ratio (x)		0.04			0.08			0.34			0.42	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.6			5.3			7.0			7.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.1			0.2			1.5			2.1	
Approach Delay, s/veh	5.6			5.3			7.0			7.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.3						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Pier View Way
Agency or Co.	IBI Group	E/W Street Name	Pier View Way
Date Performed	7/11/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	11	8	17	0	2	13	3	0	13	331	2	0	2	360	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	12	9	19	0	2	14	3	0	14	367	2	0	2	399	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		40			19			383			439	
Entry Volume veh/h		39			19			375			430	
Circulating Flow (v_c), pc/h	403			393			23			30		
Exiting Flow (v_{ex}), pc/h	13			66			382			420		
Capacity (c_{pce}), pc/h		755			763			1104			1097	
Capacity (c), veh/h		740			748			1083			1075	
v/c Ratio (x)		0.05			0.02			0.35			0.40	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.4			5.1			6.8			7.6	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.1			1.6			2.0	
Approach Delay, s/veh	5.4			5.1			6.8			7.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.1						A					

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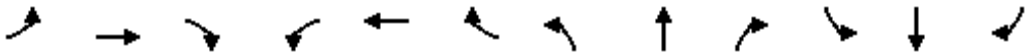


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	3	19	9	6	4	89	222	3	5	152	7
Future Volume (vph)	2	3	19	9	6	4	89	222	3	5	152	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	3	21	10	7	4	97	241	3	5	165	8

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	5	21	21	218	124	88	91
Volume Left (vph)	2	0	10	97	0	5	0
Volume Right (vph)	0	21	4	0	3	0	8
Hadj (s)	0.23	-0.67	0.01	0.26	0.02	0.06	-0.03
Departure Headway (s)	5.9	5.0	5.7	5.0	4.8	5.0	4.9
Degree Utilization, x	0.01	0.03	0.03	0.30	0.16	0.12	0.12
Capacity (veh/h)	559	655	585	703	735	701	717
Control Delay (s)	7.8	7.0	8.9	9.0	7.5	7.5	7.4
Approach Delay (s)	7.1		8.9	8.5		7.4	
Approach LOS	A		A	A		A	

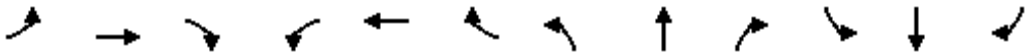
Intersection Summary				
Delay	8.1			
Level of Service	A			
Intersection Capacity Utilization	31.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	125	57	130	88	33	114
Future Volume (vph)	125	57	130	88	33	114
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	136	62	141	96	36	124

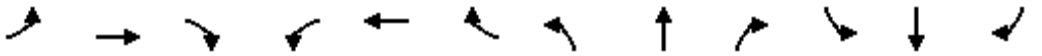
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	136	62	237	160
Volume Left (vph)	136	0	0	36
Volume Right (vph)	0	62	96	0
Hadj (s)	0.53	-0.67	-0.21	0.08
Departure Headway (s)	6.0	4.8	4.4	4.8
Degree Utilization, x	0.23	0.08	0.29	0.21
Capacity (veh/h)	568	706	777	710
Control Delay (s)	9.5	7.0	9.3	9.1
Approach Delay (s)	8.7		9.3	9.1
Approach LOS	A		A	A

Intersection Summary			
Delay	9.0		
Level of Service	A		
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		



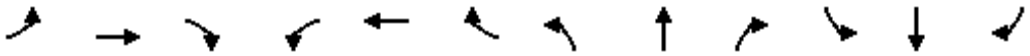
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	0	123	35	160	32	0	0	0	0	30	40
Future Volume (vph)	18	0	123	35	160	32	0	0	0	0	30	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.92	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3450						3239	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3450						3239	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	0	134	38	174	35	0	0	0	0	33	43
RTOR Reduction (vph)	0	0	122	14	13	0	0	0	0	0	40	0
Lane Group Flow (vph)	20	0	12	24	196	0	0	0	0	0	36	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	5.2		5.2	37.2	37.2						4.1	
Effective Green, g (s)	5.2		5.2	37.2	37.2						4.1	
Actuated g/C Ratio	0.09		0.09	0.62	0.62						0.07	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	153		241	1097	2139						221	
v/s Ratio Prot	c0.01		0.00	0.01	c0.06						c0.01	
v/s Ratio Perm												
v/c Ratio	0.13		0.05	0.02	0.09						0.16	
Uniform Delay, d1	25.3		25.1	4.4	4.6						26.3	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.4		0.1	0.0	0.1						0.3	
Delay (s)	25.7		25.2	4.4	4.7						26.7	
Level of Service	C		C	A	A						C	
Approach Delay (s)		25.3			4.6			0.0			26.7	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.10		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	22.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	139	226	72	69	507	0	0	289	32
Future Volume (vph)	0	0	0	139	226	72	69	507	0	0	289	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1526	1770	1863			1766	1461
Flt Permitted				0.95	1.00	1.00	0.43	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1526	796	1863			1766	1461
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	151	246	78	75	551	0	0	314	35
RTOR Reduction (vph)	0	0	0	0	0	54	0	0	0	0	1	23
Lane Group Flow (vph)	0	0	0	151	246	24	75	551	0	0	317	8
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.1	18.1	18.1	30.8	30.8			15.7	15.7
Effective Green, g (s)				18.1	18.1	18.1	30.8	30.8			15.7	15.7
Actuated g/C Ratio				0.31	0.31	0.31	0.52	0.52			0.27	0.27
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				543	1087	468	583	974			470	389
v/s Ratio Prot				c0.09	0.07		0.02	c0.30			c0.18	
v/s Ratio Perm						0.02	0.05					0.01
v/c Ratio				0.28	0.23	0.05	0.13	0.57			0.68	0.02
Uniform Delay, d1				15.5	15.2	14.4	9.9	9.5			19.3	15.9
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				1.3	0.5	0.2	0.1	0.9			4.2	0.0
Delay (s)				16.7	15.7	14.6	10.1	10.4			23.5	16.0
Level of Service				B	B	B	B	B			C	B
Approach Delay (s)		0.0			15.8			10.4			22.8	
Approach LOS		A			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	15.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	15.0
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	111	1	123	416	202	11	24	185	135	47	6
Future Volume (vph)	23	111	1	123	416	202	11	24	185	135	47	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3535		1770	3539	1583		1834	1583	1681	1714	
Flt Permitted	0.45	1.00		0.67	1.00	1.00		0.94	1.00	0.73	0.90	
Satd. Flow (perm)	846	3535		1257	3539	1583		1752	1583	1296	1570	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	121	1	134	452	220	12	26	201	147	51	7
RTOR Reduction (vph)	0	1	0	0	0	161	0	0	89	0	3	0
Lane Group Flow (vph)	25	121	0	134	452	59	0	38	112	101	101	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	15.1	15.1		14.7	14.7	14.7		30.7	30.7	30.7	30.7	
Effective Green, g (s)	15.1	15.1		14.7	14.7	14.7		30.7	30.7	30.7	30.7	
Actuated g/C Ratio	0.27	0.27		0.27	0.27	0.27		0.56	0.56	0.56	0.56	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	232	970		335	945	423		977	883	723	876	
v/s Ratio Prot		0.03			c0.13							
v/s Ratio Perm	0.03			0.11		0.04		0.02	0.07	c0.08	0.06	
v/c Ratio	0.11	0.13		0.40	0.48	0.14		0.04	0.13	0.14	0.12	
Uniform Delay, d1	14.9	15.0		16.5	16.9	15.3		5.5	5.8	5.8	5.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.1		0.9	0.5	0.2		0.1	0.3	0.4	0.3	
Delay (s)	15.2	15.1		17.5	17.4	15.5		5.6	6.1	6.2	6.0	
Level of Service	B	B		B	B	B		A	A	A	A	
Approach Delay (s)		15.1			16.9			6.0			6.1	
Approach LOS		B			B			A			A	

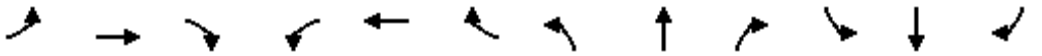
Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	78	6	22	28	6	9
Future Volume (Veh/h)	78	6	22	28	6	9
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	85	7	24	30	7	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			92		166	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			92		166	88
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		99	99
cM capacity (veh/h)			1503		811	970

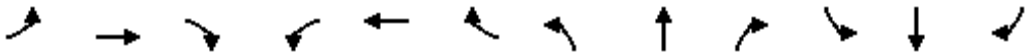
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	92	54	17
Volume Left	0	24	7
Volume Right	7	0	10
cSH	1700	1503	897
Volume to Capacity	0.05	0.02	0.02
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	3.4	9.1
Lane LOS		A	A
Approach Delay (s)	0.0	3.4	9.1
Approach LOS			A

Intersection Summary			
Average Delay		2.1	
Intersection Capacity Utilization		19.4%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	93	53	99	0	0	0	28	215	58	68	208	55
Future Volume (vph)	93	53	99	0	0	0	28	215	58	68	208	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.95				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1498				1770	1863	1552	1770	1863	1518
Flt Permitted	0.95	1.00	1.00				0.62	1.00	1.00	0.45	1.00	1.00
Satd. Flow (perm)	1770	1863	1498				1150	1863	1552	831	1863	1518
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	58	108	0	0	0	30	234	63	74	226	60
RTOR Reduction (vph)	0	0	60	0	0	0	0	0	45	0	0	36
Lane Group Flow (vph)	101	58	48	0	0	0	30	234	18	74	226	24
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	24.3	24.3	24.3				15.5	15.5	15.5	21.9	21.9	21.9
Effective Green, g (s)	24.3	24.3	24.3				15.5	15.5	15.5	21.9	21.9	21.9
Actuated g/C Ratio	0.44	0.44	0.44				0.28	0.28	0.28	0.40	0.40	0.40
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	782	823	661				324	525	437	371	741	604
v/s Ratio Prot	c0.06	0.03						c0.13		0.01	c0.12	
v/s Ratio Perm			0.03				0.03		0.01	0.07		0.02
v/c Ratio	0.13	0.07	0.07				0.09	0.45	0.04	0.20	0.30	0.04
Uniform Delay, d1	9.1	8.8	8.9				14.6	16.2	14.3	10.7	11.3	10.1
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	0.2				0.6	2.7	0.2	0.3	1.1	0.1
Delay (s)	9.4	9.0	9.1				15.1	18.9	14.5	10.9	12.4	10.2
Level of Service	A	A	A				B	B	B	B	B	B
Approach Delay (s)		9.2			0.0			17.7			11.7	
Approach LOS		A			A			B			B	

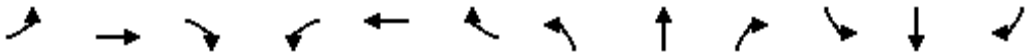
Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	188	9	0	0	0	0	4	16	21	8	0
Future Volume (Veh/h)	11	188	9	0	0	0	0	4	16	21	8	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	204	10	0	0	0	0	4	17	23	9	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			214			238	233	107	145	238	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			214			238	233	107	145	238	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	98	97	99	100
cM capacity (veh/h)	1622			1353			686	661	926	787	657	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	114	112	21	32
Volume Left	12	0	0	23
Volume Right	0	10	17	0
cSH	1622	1700	861	745
Volume to Capacity	0.01	0.07	0.02	0.04
Queue Length 95th (ft)	1	0	2	3
Control Delay (s)	0.8	0.0	9.3	10.0
Lane LOS	A		A	B
Approach Delay (s)	0.4		9.3	10.0
Approach LOS			A	B

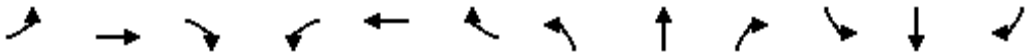
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	20.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	23	425	4	0	0	0	0	4	20	14	13	0
Future Volume (vph)	23	425	4	0	0	0	0	4	20	14	13	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	462	4	0	0	0	0	4	22	15	14	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	256	235	26	29
Volume Left (vph)	25	0	0	15
Volume Right (vph)	0	4	22	0
Hadj (s)	0.08	0.02	-0.47	0.14
Departure Headway (s)	4.7	4.7	4.5	5.1
Degree Utilization, x	0.34	0.30	0.03	0.04
Capacity (veh/h)	754	760	744	656
Control Delay (s)	8.9	8.5	7.6	8.3
Approach Delay (s)	8.7		7.6	8.3
Approach LOS	A		A	A

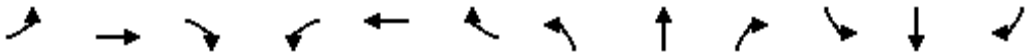
Intersection Summary				
Delay	8.6			
Level of Service	A			
Intersection Capacity Utilization	27.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	90	171	9	39	0	91	0	45	29	0	0	0
Future Volume (vph)	90	171	9	39	0	91	0	45	29	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	98	186	10	42	0	99	0	49	32	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	98	196	141	81
Volume Left (vph)	98	0	42	0
Volume Right (vph)	0	10	99	32
Hadj (s)	0.53	0.00	-0.33	-0.20
Departure Headway (s)	5.3	4.8	4.2	4.7
Degree Utilization, x	0.15	0.26	0.16	0.10
Capacity (veh/h)	662	732	826	716
Control Delay (s)	8.0	8.3	8.0	8.2
Approach Delay (s)	8.2		8.0	8.2
Approach LOS	A		A	A

Intersection Summary				
Delay	8.2			
Level of Service	A			
Intersection Capacity Utilization	31.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	13	0	0	31	13	235	20	14	243	6
Future Volume (Veh/h)	0	0	13	0	0	31	13	235	20	14	243	6
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	14	0	0	34	14	255	22	15	264	7
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked												
vC, conflicting volume	622	616	274	609	609	273	278			284		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	622	616	274	609	609	273	278			284		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	96	99			99		
cM capacity (veh/h)	369	391	760	386	395	760	1277			1268		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	14	34	14	277	15	271
Volume Left	0	0	14	0	15	0
Volume Right	14	34	0	22	0	7
cSH	760	760	1277	1700	1268	1700
Volume to Capacity	0.02	0.04	0.01	0.16	0.01	0.16
Queue Length 95th (ft)	1	4	1	0	1	0
Control Delay (s)	9.8	10.0	7.8	0.0	7.9	0.0
Lane LOS	A	A	A		A	
Approach Delay (s)	9.8	10.0	0.4		0.4	
Approach LOS	A	A				

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	23.6%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Washington Avenue
Agency or Co.	IBI Group	E/W Street Name	Washington Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	2	25	0	37	6	4	0	18	241	11	0	3	251	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	16	2	28	0	41	7	4	0	20	267	12	0	3	278	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		46			52			299			301	
Entry Volume veh/h		45			51			293			295	
Circulating Flow (v_c), pc/h	322			303			21			68		
Exiting Flow (v_{ex}), pc/h	17			47			287			347		
Capacity (c_{pce}), pc/h		819			835			1107			1056	
Capacity (c), veh/h		803			818			1085			1035	
v/c Ratio (x)		0.06			0.06			0.27			0.29	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.0			5.0			5.9			6.3	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.2			1.1			1.2	
Approach Delay, s/veh	5.0			5.0			5.9			6.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.9						A					

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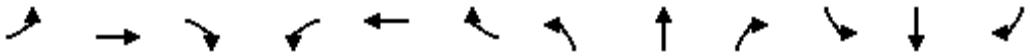
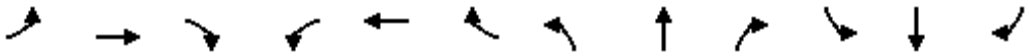


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	22	29	18	26	4	80	3	152	41	95	104	1
Future Volume (vph)	22	29	18	26	4	80	3	152	41	95	104	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	32	20	28	4	87	3	165	45	103	113	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	76	119	213	217
Volume Left (vph)	24	28	3	103
Volume Right (vph)	20	87	45	1
Hadj (s)	-0.06	-0.36	-0.09	0.13
Departure Headway (s)	5.0	4.7	4.6	4.8
Degree Utilization, x	0.11	0.15	0.27	0.29
Capacity (veh/h)	642	695	748	715
Control Delay (s)	8.6	8.5	9.3	9.7
Approach Delay (s)	8.6	8.5	9.3	9.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.2			
Level of Service	A			
Intersection Capacity Utilization	39.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	204	24	5	94	16	12	26	30	22	36	12
Future Volume (Veh/h)	8	204	24	5	94	16	12	26	30	22	36	12
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	222	26	5	102	17	13	28	33	24	39	13
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	133			255			414	403	242	434	408	126
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	133			255			414	403	242	434	408	126
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			97	95	96	95	92	99
cM capacity (veh/h)	1435			1302			496	522	792	473	519	913

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	257	124	74	76
Volume Left	9	5	13	24
Volume Right	26	17	33	13
cSH	1435	1302	609	542
Volume to Capacity	0.01	0.00	0.12	0.14
Queue Length 95th (ft)	0	0	10	12
Control Delay (s)	0.3	0.3	11.7	12.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	11.7	12.7
Approach LOS			B	B

Intersection Summary				
Average Delay	3.7			
Intersection Capacity Utilization	28.7%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	53	53	134	0	87	28	27	0	65	251	62	0	16	276	18
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	59	59	149	0	96	31	30	0	72	278	69	0	18	306	20
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		267			157			419			344	
Entry Volume veh/h		262			154			411			337	
Circulating Flow (v_c), pc/h		420			409			136			199	
Exiting Flow (v_{ex}), pc/h		146			123			367			551	
Capacity (c_{pce}), pc/h		742			751			986			926	
Capacity (c), veh/h		728			736			967			908	
v/c Ratio (x)		0.36			0.21			0.42			0.37	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.5			7.2			8.6			8.1	
Lane LOS		A			A			A			A	
95% Queue, veh		1.6			0.8			2.1			1.7	
Approach Delay, s/veh	9.5			7.2			8.6			8.1		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.5						A					

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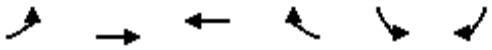
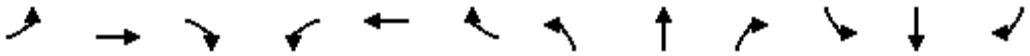


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	208	201	5	16	15
Future Volume (Veh/h)	8	208	201	5	16	15
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	226	218	5	17	16
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	231				474	230
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	231				474	230
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	98
cM capacity (veh/h)	1328				542	804

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	235	223	33
Volume Left	9	0	17
Volume Right	0	5	16
cSH	1328	1700	643
Volume to Capacity	0.01	0.13	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.4	0.0	10.9
Lane LOS	A		B
Approach Delay (s)	0.4	0.0	10.9
Approach LOS			B

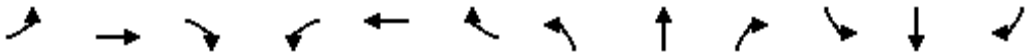
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	27.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	193	9	20	182	11	5	5	13	33	1	5
Future Volume (Veh/h)	7	193	9	20	182	11	5	5	13	33	1	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	210	10	22	198	12	5	5	14	36	1	5
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	212			220			486	487	215	498	486	208
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	212			220			486	487	215	498	486	208
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			99	99	98	92	100	99
cM capacity (veh/h)	1356			1349			478	469	825	462	470	830

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	228	232	24	42
Volume Left	8	22	5	36
Volume Right	10	12	14	5
cSH	1356	1349	630	488
Volume to Capacity	0.01	0.02	0.04	0.09
Queue Length 95th (ft)	0	1	3	7
Control Delay (s)	0.3	0.9	10.9	13.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.9	10.9	13.1
Approach LOS			B	B

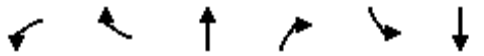
Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	32.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	111	175	69	141	0	94	0	35	0	0	0
Future Volume (vph)	0	111	175	69	141	0	94	0	35	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	121	190	75	153	0	102	0	38	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	311	228	140	0
Volume Left (vph)	0	75	102	0
Volume Right (vph)	190	0	38	0
Hadj (s)	-0.33	0.10	0.02	0.00
Departure Headway (s)	4.2	4.7	5.1	5.3
Degree Utilization, x	0.36	0.30	0.20	0.00
Capacity (veh/h)	822	729	643	595
Control Delay (s)	9.6	9.7	9.4	8.3
Approach Delay (s)	9.6	9.7	9.4	0.0
Approach LOS	A	A	A	A

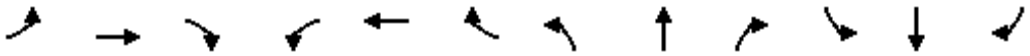
Intersection Summary				
Delay	9.6			
Level of Service	A			
Intersection Capacity Utilization	49.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	51	69	101	32	81	121
Future Volume (vph)	51	69	101	32	81	121
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	55	75	110	35	88	132

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	130	145	220
Volume Left (vph)	55	0	88
Volume Right (vph)	75	35	0
Hadj (s)	-0.23	-0.11	0.11
Departure Headway (s)	4.5	4.4	4.5
Degree Utilization, x	0.16	0.18	0.27
Capacity (veh/h)	738	791	770
Control Delay (s)	8.4	8.3	9.2
Approach Delay (s)	8.4	8.3	9.2
Approach LOS	A	A	A

Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	235	1	6	189	40	7	10	11	40	16	10
Future Volume (Veh/h)	8	235	1	6	189	40	7	10	11	40	16	10
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	255	1	7	205	43	8	11	12	43	17	11
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.93						0.93	0.93		0.93	0.93	0.93
vC, conflicting volume	251			267			548	550	274	542	528	234
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	153			267			474	475	274	467	452	134
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	98	98	90	96	99
cM capacity (veh/h)	1320			1285			432	442	752	441	455	843

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	265	255	31	71
Volume Left	9	7	8	43
Volume Right	1	43	12	11
cSH	1320	1285	522	480
Volume to Capacity	0.01	0.01	0.06	0.15
Queue Length 95th (ft)	1	0	5	13
Control Delay (s)	0.3	0.3	12.3	13.8
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	12.3	13.8
Approach LOS			B	B

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Oceanside Blvd
E/W Street Name	Oceanside Boulevard
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	21	132	76	0	112	134	101	0	39	226	60	0	110	287	15
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	23	146	84	0	124	149	112	0	43	251	67	0	122	318	17
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		253			385			361			457	
Entry Volume veh/h		248			377			354			448	
Circulating Flow (v_c), pc/h	564			317			291			316		
Exiting Flow (v_{ex}), pc/h	335			209			386			526		
Capacity (c_{pce}), pc/h		643			823			845			824	
Capacity (c), veh/h		630			807			828			808	
v/c Ratio (x)		0.39			0.47			0.43			0.55	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		11.3			10.7			9.7			12.6	
Lane LOS		B			B			A			B	
95% Queue, veh		1.9			2.5			2.2			3.5	
Approach Delay, s/veh	11.3			10.7			9.7			12.6		
Approach LOS	B			B			A			B		
Intersection Delay, s/veh | LOS	11.2						B					

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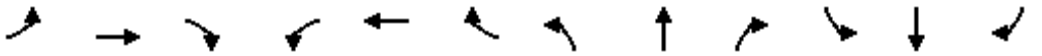

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	324	0	16	417	79	8	8	34	243	13	44
Future Volume (vph)	11	324	0	16	417	79	8	8	34	243	13	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.98			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3539		1755	3446			3121			1777	1527
Flt Permitted	0.34	1.00		0.53	1.00			0.92			0.69	1.00
Satd. Flow (perm)	635	3539		979	3446			2886			1293	1527
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	352	0	17	453	86	9	9	37	264	14	48
RTOR Reduction (vph)	0	0	0	0	38	0	0	15	0	0	0	20
Lane Group Flow (vph)	12	352	0	17	501	0	0	40	0	0	278	28
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	13.4	13.4		13.4	13.4			32.1			32.1	32.1
Effective Green, g (s)	13.4	13.4		13.4	13.4			32.1			32.1	32.1
Actuated g/C Ratio	0.24	0.24		0.24	0.24			0.58			0.58	0.58
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	154	862		238	839			1684			754	891
v/s Ratio Prot		0.10			c0.15							
v/s Ratio Perm	0.02			0.02				0.01			c0.22	0.02
v/c Ratio	0.08	0.41		0.07	0.60			0.02			0.37	0.03
Uniform Delay, d1	16.0	17.5		16.0	18.4			4.8			6.1	4.9
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.2	0.3		0.1	1.2			0.0			1.4	0.1
Delay (s)	16.3	17.8		16.1	19.6			4.9			7.5	4.9
Level of Service	B	B		B	B			A			A	A
Approach Delay (s)		17.7			19.5			4.9			7.1	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Morse Street
Agency or Co.	IBI Group	E/W Street Name	Morse Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	24	13	17	0	31	8	114	0	3	378	61	0	95	511	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	27	14	19	0	34	9	126	0	3	419	68	0	105	567	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		60			169			490			691	
Entry Volume veh/h		59			166			480			677	
Circulating Flow (v_c), pc/h	706			449			146			46		
Exiting Flow (v_{ex}), pc/h	187			31			572			620		
Capacity (c_{pce}), pc/h		558			721			977			1079	
Capacity (c), veh/h		547			707			957			1058	
v/c Ratio (x)		0.11			0.23			0.50			0.64	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.9			7.8			10.0			12.4	
Lane LOS		A			A			A			B	
95% Queue, veh		0.4			0.9			2.9			4.8	
Approach Delay, s/veh	7.9			7.8			10.0			12.4		
Approach LOS	A			A			A			B		
Intersection Delay, s/veh | LOS	10.8						B					

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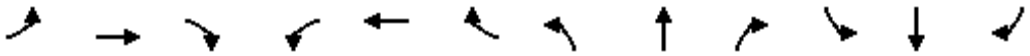


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	144	24	38	125	0	21	0	31	0	0	0
Future Volume (Veh/h)	0	144	24	38	125	0	21	0	31	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	157	26	41	136	0	23	0	34	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	136			183			388	388	170	422	401	136
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	136			183			388	388	170	422	401	136
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			96	100	96	100	100	100
cM capacity (veh/h)	1448			1392			558	531	874	509	522	913

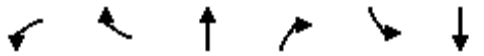
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	183	177	57	0
Volume Left	0	41	23	0
Volume Right	26	0	34	0
cSH	1448	1392	711	1700
Volume to Capacity	0.00	0.03	0.08	0.00
Queue Length 95th (ft)	0	2	7	0
Control Delay (s)	0.0	2.0	10.5	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	2.0	10.5	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	31.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	63	15	4	45	1	26	0	11	1	0	1
Future Volume (Veh/h)	1	63	15	4	45	1	26	0	11	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	68	16	4	49	1	28	0	12	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	50			84			136	136	76	148	144	50
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	50			84			136	136	76	148	144	50
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	100	99	100	100	100
cM capacity (veh/h)	1557			1513			832	752	985	809	745	1019

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	85	54	40	2
Volume Left	1	4	28	1
Volume Right	16	1	12	1
cSH	1557	1513	872	902
Volume to Capacity	0.00	0.00	0.05	0.00
Queue Length 95th (ft)	0	0	4	0
Control Delay (s)	0.1	0.6	9.3	9.0
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.6	9.3	9.0
Approach LOS			A	A

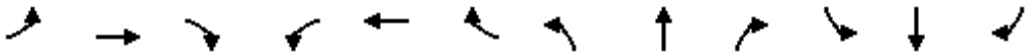
Intersection Summary				
Average Delay	2.4			
Intersection Capacity Utilization	14.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	37	106	15	37	132	15
Future Volume (vph)	37	106	15	37	132	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	115	16	40	143	16

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	155	56	159
Volume Left (vph)	40	0	143
Volume Right (vph)	115	40	0
Hadj (s)	-0.36	-0.39	0.21
Departure Headway (s)	4.0	4.0	4.5
Degree Utilization, x	0.17	0.06	0.20
Capacity (veh/h)	850	847	763
Control Delay (s)	7.9	7.3	8.6
Approach Delay (s)	7.9	7.3	8.6
Approach LOS	A	A	A

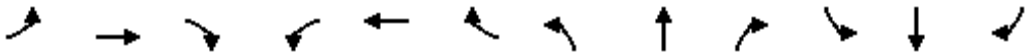
Intersection Summary			
Delay	8.1		
Level of Service	A		
Intersection Capacity Utilization	30.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	118	91	15	79	3	69	9	15	13	10	5
Future Volume (Veh/h)	3	118	91	15	79	3	69	9	15	13	10	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	128	99	16	86	3	75	10	16	14	11	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	89			227			314	304	178	324	352	88
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			227			314	304	178	324	352	88
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			88	98	98	98	98	99
cM capacity (veh/h)	1506			1341			620	600	866	603	564	971

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	230	105	101	30
Volume Left	3	16	75	14
Volume Right	99	3	16	5
cSH	1506	1341	647	627
Volume to Capacity	0.00	0.01	0.16	0.05
Queue Length 95th (ft)	0	1	14	4
Control Delay (s)	0.1	1.3	11.6	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	1.3	11.6	11.0
Approach LOS			B	B

Intersection Summary				
Average Delay	3.6			
Intersection Capacity Utilization	28.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	139	9	6	86	2	2	2	17	1	3	1
Future Volume (Veh/h)	0	139	9	6	86	2	2	2	17	1	3	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	151	10	7	93	2	2	2	18	1	3	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	95			161			266	265	156	283	269	94
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	95			161			266	265	156	283	269	94
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	100	100	100
cM capacity (veh/h)	1499			1418			680	637	890	652	634	963

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	161	102	22	5
Volume Left	0	7	2	1
Volume Right	10	2	18	1
cSH	1499	1418	836	685
Volume to Capacity	0.00	0.00	0.03	0.01
Queue Length 95th (ft)	0	0	2	1
Control Delay (s)	0.0	0.6	9.4	10.3
Lane LOS		A	A	B
Approach Delay (s)	0.0	0.6	9.4	10.3
Approach LOS			A	B

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	19.6%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Cassidy Street
Agency or Co.	IBI Group	E/W Street Name	Cassidy Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	64	89	55	0	74	41	23	0	69	316	43	0	54	346	13
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	71	99	61	0	82	45	26	0	76	350	48	0	60	384	14
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			4.9763	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		231			153			474			458	
Entry Volume veh/h		226			150			465			449	
Circulating Flow (v_c), pc/h		526			497			230			203	
Exiting Flow (v_{ex}), pc/h		207			135			447			527	
Capacity (c_{pce}), pc/h		668			687			898			1122	
Capacity (c), veh/h		655			674			880			1100	
v/c Ratio (x)		0.35			0.22			0.53			0.41	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		10.1			8.0			11.2			7.6	
Lane LOS		B			A			B			A	
95% Queue, veh		1.5			0.8			3.2			2.0	
Approach Delay, s/veh	10.1			8.0			11.2			7.6		
Approach LOS	B			A			B			A		
Intersection Delay, s/veh | LOS	9.4						A					

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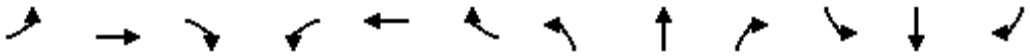
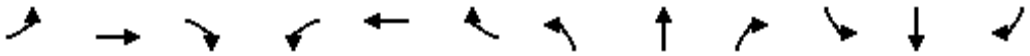


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	116	28	33	66	13	11	27	28	10	23	19
Future Volume (Veh/h)	16	116	28	33	66	13	11	27	28	10	23	19
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	126	30	36	72	14	12	29	30	11	25	21
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	86			156			360	333	141	370	341	79
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	86			156			360	333	141	370	341	79
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			98	95	97	98	96	98
cM capacity (veh/h)	1510			1424			548	566	907	530	560	981

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	173	122	71	57
Volume Left	17	36	12	11
Volume Right	30	14	30	21
cSH	1510	1424	668	657
Volume to Capacity	0.01	0.03	0.11	0.09
Queue Length 95th (ft)	1	2	9	7
Control Delay (s)	0.8	2.4	11.0	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.8	2.4	11.0	11.0
Approach LOS			B	B

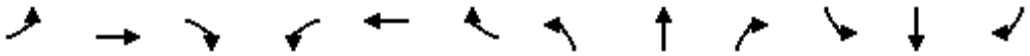
Intersection Summary				
Average Delay	4.4			
Intersection Capacity Utilization	24.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	62	14	8	38	2	11	22	19	11	11	7
Future Volume (vph)	5	62	14	8	38	2	11	22	19	11	11	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	67	15	9	41	2	12	24	21	12	12	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	87	52	57	32
Volume Left (vph)	5	9	12	12
Volume Right (vph)	15	2	21	8
Hadj (s)	-0.06	0.05	-0.14	-0.04
Departure Headway (s)	4.1	4.2	4.1	4.2
Degree Utilization, x	0.10	0.06	0.06	0.04
Capacity (veh/h)	856	828	842	819
Control Delay (s)	7.5	7.5	7.4	7.4
Approach Delay (s)	7.5	7.5	7.4	7.4
Approach LOS	A	A	A	A

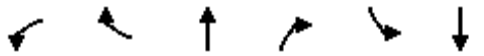
Intersection Summary				
Delay	7.5			
Level of Service	A			
Intersection Capacity Utilization	14.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	5	108	4	26	49	15	4	45	108	114	8	5
Future Volume (vph)	5	108	4	26	49	15	4	45	108	114	8	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	117	4	28	53	16	4	49	117	124	9	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	126	97	170	138
Volume Left (vph)	5	28	4	124
Volume Right (vph)	4	16	117	5
Hadj (s)	0.02	-0.01	-0.37	0.19
Departure Headway (s)	4.8	4.8	4.3	4.8
Degree Utilization, x	0.17	0.13	0.20	0.19
Capacity (veh/h)	698	694	796	698
Control Delay (s)	8.7	8.5	8.3	8.9
Approach Delay (s)	8.7	8.5	8.3	8.9
Approach LOS	A	A	A	A

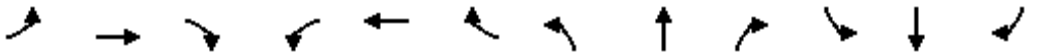
Intersection Summary				
Delay	8.6			
Level of Service	A			
Intersection Capacity Utilization	37.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	51	33	13	59	67
Future Volume (vph)	0	51	33	13	59	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	55	36	14	64	73

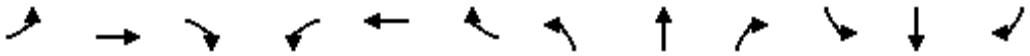
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	55	50	137
Volume Left (vph)	0	0	64
Volume Right (vph)	55	14	0
Hadj (s)	-0.57	-0.13	0.13
Departure Headway (s)	3.7	4.0	4.2
Degree Utilization, x	0.06	0.06	0.16
Capacity (veh/h)	914	869	845
Control Delay (s)	7.0	7.2	8.0
Approach Delay (s)	7.0	7.2	8.0
Approach LOS	A	A	A

Intersection Summary			
Delay	7.6		
Level of Service	A		
Intersection Capacity Utilization	16.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	121	40	256	49	216	29	213	122	183	300	6
Future Volume (vph)	15	121	40	256	49	216	29	213	122	183	300	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.95		1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1555		1788	1794	1770	3743		2006	3998	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1555		1788	1794	1770	3743		2006	3998	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	132	43	278	53	235	32	232	133	199	326	7
RTOR Reduction (vph)	0	0	39	0	0	156	0	94	0	0	2	0
Lane Group Flow (vph)	16	132	4	0	331	79	32	271	0	199	331	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	6.7	6.7	6.7		16.5	23.3	1.4	20.6		6.8	26.0	
Effective Green, g (s)	6.7	6.7	6.7		16.5	23.3	1.4	20.6		6.8	26.0	
Actuated g/C Ratio	0.10	0.10	0.10		0.24	0.33	0.02	0.30		0.10	0.37	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	192	179	149		423	599	35	1106		195	1491	
v/s Ratio Prot	0.01	c0.07			c0.19	0.04	0.02	0.07		c0.10	c0.08	
v/s Ratio Perm			0.00									
v/c Ratio	0.08	0.74	0.03		0.78	0.13	0.91	0.25		1.02	0.22	
Uniform Delay, d1	28.7	30.6	28.5		24.9	16.2	34.1	18.6		31.5	14.9	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	12.7	0.0		9.1	0.1	115.3	0.5		69.9	0.3	
Delay (s)	28.8	43.4	28.6		34.0	16.3	149.4	19.2		101.3	15.3	
Level of Service	C	D	C		C	B	F	B		F	B	
Approach Delay (s)		38.8			26.7			29.7			47.5	
Approach LOS		D			C			C			D	

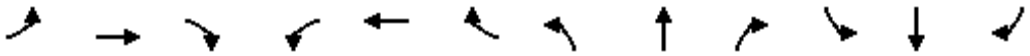
Intersection Summary			
HCM 2000 Control Delay	35.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	69.7	Sum of lost time (s)	19.1
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	434	5	16	646	50	0	0	27	28	0	30
Future Volume (Veh/h)	8	434	5	16	646	50	0	0	27	28	0	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	472	5	17	702	54	0	0	29	30	0	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.94			0.94	0.94	0.94	0.94	0.94	
vC, conflicting volume	756			477			1288	1282	474	1284	1258	729
vC1, stage 1 conf vol							492	492		763	763	
vC2, stage 2 conf vol							796	790		522	495	
vCu, unblocked vol	756			412			1275	1269	409	1271	1243	729
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			100	100	95	91	100	92
cM capacity (veh/h)	855			1078			300	336	604	323	345	423

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	486	773	29	63
Volume Left	9	17	0	30
Volume Right	5	54	29	33
cSH	855	1078	604	368
Volume to Capacity	0.01	0.02	0.05	0.17
Queue Length 95th (ft)	1	1	4	15
Control Delay (s)	0.3	0.4	11.3	16.8
Lane LOS	A	A	B	C
Approach Delay (s)	0.3	0.4	11.3	16.8
Approach LOS			B	C

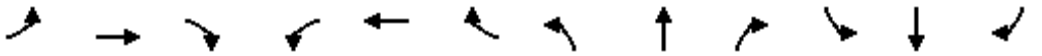
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	62.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	539	12	36	848	28	12	5	78	33	5	17
Future Volume (Veh/h)	11	539	12	36	848	28	12	5	78	33	5	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	586	13	39	922	30	13	5	85	36	5	18
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.98			0.98	0.98	0.98	0.98	0.98	
vC, conflicting volume	952			600			1639	1648	594	1712	1639	938
vC1, stage 1 conf vol							618	618		1015	1015	
vC2, stage 2 conf vol							1022	1030		698	624	
vCu, unblocked vol	952			583			1642	1650	577	1716	1642	938
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			96			94	98	83	83	98	94
cM capacity (veh/h)	722			972			217	251	507	207	256	320

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	12	599	39	952	103	59
Volume Left	12	0	39	0	13	36
Volume Right	0	13	0	30	85	18
cSH	722	1700	972	1700	416	237
Volume to Capacity	0.02	0.35	0.04	0.56	0.25	0.25
Queue Length 95th (ft)	1	0	3	0	24	24
Control Delay (s)	10.1	0.0	8.9	0.0	16.5	25.2
Lane LOS	B		A		C	D
Approach Delay (s)	0.2		0.3		16.5	25.2
Approach LOS					C	D

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	62.8%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	773	0	0	998	147	0	0	0	0	0	24
Future Volume (Veh/h)	31	773	0	0	998	147	0	0	0	0	0	24
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	34	840	0	0	1085	160	0	0	0	0	0	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1245			840			2019	2153	840	2073	2073	1165
vC1, stage 1 conf vol							908	908		1165	1165	
vC2, stage 2 conf vol							1111	1245		908	908	
vCu, unblocked vol	1245			840			2019	2153	840	2073	2073	1165
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	94			100			100	100	100	100	100	89
cM capacity (veh/h)	559			795			161	178	365	185	208	236

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	34	840	0	1245	0	26
Volume Left	34	0	0	0	0	0
Volume Right	0	0	0	160	0	26
cSH	559	1700	1700	1700	1700	236
Volume to Capacity	0.06	0.49	0.00	0.73	0.00	0.11
Queue Length 95th (ft)	5	0	0	0	0	9
Control Delay (s)	11.9	0.0	0.0	0.0	0.0	22.1
Lane LOS	B				A	C
Approach Delay (s)	0.5		0.0		0.0	22.1
Approach LOS					A	C

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	71.4%	ICU Level of Service		C
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	82	0	0	70	35	306	28	50	692	12
Future Volume (Veh/h)	0	0	82	0	0	70	35	306	28	50	692	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	89	0	0	76	38	333	30	54	752	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1185	1306	758	1373	1297	182	765			363		
vC1, stage 1 conf vol	866	866		424	424							
vC2, stage 2 conf vol	318	439		949	873							
vCu, unblocked vol	1185	1306	758	1373	1297	182	765			363		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	75	100	100	91	95			95		
cM capacity (veh/h)	272	307	349	155	287	830	844			1192		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	89	76	38	222	141	54	765
Volume Left	0	0	38	0	0	54	0
Volume Right	89	76	0	0	30	0	13
cSH	349	830	844	1700	1700	1192	1700
Volume to Capacity	0.25	0.09	0.05	0.13	0.08	0.05	0.45
Queue Length 95th (ft)	25	8	4	0	0	4	0
Control Delay (s)	18.8	9.8	9.5	0.0	0.0	8.2	0.0
Lane LOS	C	A	A			A	
Approach Delay (s)	18.8	9.8	0.9			0.5	
Approach LOS	C	A					

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	48.9%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Michigan Avenue
Agency or Co.	IBI Group	E/W Street Name	Michigan Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	84	13	36	0	45	15	8	0	22	234	6	0	6	230	27
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	93	14	40	0	50	17	9	0	24	259	7	0	7	255	30
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		147			76			290			292	
Entry Volume veh/h		144			75			284			286	
Circulating Flow (v_c), pc/h	312			376			114			91		
Exiting Flow (v_{ex}), pc/h	28			71			361			345		
Capacity (c_{pce}), pc/h		827			776			1008			1032	
Capacity (c), veh/h		811			761			988			1011	
v/c Ratio (x)		0.18			0.10			0.29			0.28	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.3			5.7			6.5			6.4	
Lane LOS		A			A			A			A	
95% Queue, veh		0.6			0.3			1.2			1.2	
Approach Delay, s/veh	6.3			5.7			6.5			6.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.4						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - West
Agency or Co.	IBI Group	E/W Street Name	West Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	16	9	18	0	20	9	18	0	18	132	20	0	18	132	16
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	18	10	20	0	22	10	20	0	20	146	22	0	20	146	18
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		48			52			188			184	
Entry Volume veh/h		47			51			184			180	
Circulating Flow (v_c), pc/h	188			184			48			52		
Exiting Flow (v_{ex}), pc/h	52			48			184			188		
Capacity (c_{pce}), pc/h		936			940			1077			1073	
Capacity (c), veh/h		918			922			1056			1052	
v/c Ratio (x)		0.05			0.06			0.17			0.17	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.4			4.4			5.0			5.0	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.2			0.6			0.6	
Approach Delay, s/veh	4.4			4.4			5.0			5.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	4.9						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Kelly
Agency or Co.	IBI Group	E/W Street Name	Kelly Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	21	13	0	15	12	96	0	5	154	14	0	88	146	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	16	23	14	0	17	13	106	0	6	171	16	0	98	162	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		53			136			193			293	
Entry Volume veh/h		52			133			189			287	
Circulating Flow (v_c), pc/h	277			193			137			36		
Exiting Flow (v_{ex}), pc/h	137			52			293			193		
Capacity (c_{pce}), pc/h		857			932			985			1090	
Capacity (c), veh/h		840			913			966			1069	
v/c Ratio (x)		0.06			0.15			0.20			0.27	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.9			5.3			5.6			5.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.5			0.7			1.1	
Approach Delay, s/veh	4.9			5.3			5.6			5.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.6						A					

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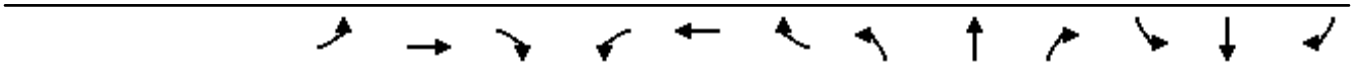


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Future Volume (veh/h)	0	0	0	150	6	32	7	66	8	22	737	18
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				168	0	0	8	72	0	24	801	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				1328	0	593	148	1692	527	148	1178	527
Arrive On Green				0.36	0.00	0.00	0.08	0.32	0.00	0.08	0.32	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				168	0	0	8	72	0	24	801	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Cycle Q Clear(g_c), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.5	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				1328	0	593	148	1692	527	148	1178	527
V/C Ratio(X)				0.13	0.00	0.00	0.05	0.04	0.00	0.16	0.68	0.00
Avail Cap(c_a), veh/h				1328	0	593	148	1692	527	148	1178	527
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				10.7	0.0	0.0	21.3	11.7	0.0	21.4	14.8	0.0
Incr Delay (d2), s/veh				0.2	0.0	0.0	0.7	0.0	0.0	2.4	3.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	0.0	0.1	0.2	0.0	0.4	5.3	0.0
LnGrp Delay(d),s/veh				10.9	0.0	0.0	21.9	11.8	0.0	23.8	18.0	0.0
LnGrp LOS				B			C	B		C	B	
Approach Vol, veh/h					168			80			825	
Approach Delay, s/veh					10.9			12.8			18.1	
Approach LOS					B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	20.0			8.0	20.0		22.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	16.0			4.0	16.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	2.5			2.2	11.5		3.5
Green Ext Time (p_c), s	0.0	0.2			0.0	2.2		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	16.6
HCM 2010 LOS	B

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	531	188	479	1082	0	0
Future Volume (veh/h)	531	188	479	1082	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	577	204	521	1176		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1840	823	1074	3313		
Arrive On Green	0.50	0.50	0.30	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	577	204	521	1176		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	3.7	2.8	4.8	1.9		
Cycle Q Clear(g_c), s	3.7	2.8	4.8	1.9		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1840	823	1074	3313		
V/C Ratio(X)	0.31	0.25	0.49	0.35		
Avail Cap(c_a), veh/h	1840	823	1074	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.9	5.7	11.5	0.3		
Incr Delay (d2), s/veh	0.4	0.7	1.6	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.0	1.4	2.5	1.0		
LnGrp Delay(d),s/veh	6.4	6.4	13.0	0.6		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	781			1697		
Approach Delay, s/veh	6.4			4.4		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			16.0	24.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			12.0	20.0				36.0
Max Q Clear Time (g_c+I1), s			6.8	5.7				3.9
Green Ext Time (p_c), s			1.0	4.0				10.8

Intersection Summary	
HCM 2010 Ctrl Delay	5.0
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	640	67	807	1970	67	1
Future Volume (veh/h)	640	67	807	1970	67	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	696	73	877	2141	73	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	982	439	954	2208	492	439
Arrive On Green	0.27	0.27	0.27	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	696	73	877	2141	73	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	10.3	2.0	14.3	33.4	1.8	0.0
Cycle Q Clear(g_c), s	10.3	2.0	14.3	33.4	1.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	982	439	954	2208	492	439
V/C Ratio(X)	0.71	0.17	0.92	0.97	0.15	0.00
Avail Cap(c_a), veh/h	982	439	954	2208	492	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.9	16.9	21.4	11.5	16.8	0.0
Incr Delay (d2), s/veh	4.3	0.8	15.1	13.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.8	1.0	8.9	20.4	1.0	0.0
LnGrp Delay(d),s/veh	24.2	17.7	36.5	24.7	17.4	0.0
LnGrp LOS	C	B	D	C	B	
Approach Vol, veh/h	769			3018	73	
Approach Delay, s/veh	23.6			28.1	17.4	
Approach LOS	C			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		3.8	16.3	12.3				35.4
Green Ext Time (p_c), s		0.1	0.0	1.7				0.6

Intersection Summary	
HCM 2010 Ctrl Delay	27.0
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Future Volume (veh/h)	0	287	3	92	499	172	10	0	111	22	31	32
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	312	3	100	542	0	11	0	121	24	34	35
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1149	11	284	1982	887	0	0	0	568	596	507
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3832	36	1845	3681	1647		0		1845	1937	1647
Grp Volume(v), veh/h	0	154	161	100	542	0		0.0		24	34	35
Grp Sat Flow(s),veh/h/ln	0	1840	1931	1845	1840	1647				1845	1937	1647
Q Serve(g_s), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Cycle Q Clear(g_c), s	0.0	3.3	3.3	2.5	4.1	0.0				0.5	0.6	0.8
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	566	594	284	1982	887				568	596	507
V/C Ratio(X)	0.00	0.27	0.27	0.35	0.27	0.00				0.04	0.06	0.07
Avail Cap(c_a), veh/h	0	566	594	284	1982	887				568	596	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.6	13.6	19.7	6.5	0.0				12.6	12.7	12.7
Incr Delay (d2), s/veh	0.0	1.2	1.1	3.4	0.3	0.0				0.1	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.8	1.9	1.5	2.1	0.0				0.3	0.4	0.4
LnGrp Delay(d),s/veh	0.0	14.8	14.7	23.1	6.8	0.0				12.8	12.9	13.0
LnGrp LOS		B	B	C	A					B	B	B
Approach Vol, veh/h		315			642						93	
Approach Delay, s/veh		14.7			9.4						12.9	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			4.5	5.3		2.8		6.1
Green Ext Time (p_c), s			0.1	1.3		0.2		3.7

Intersection Summary	
HCM 2010 Ctrl Delay	11.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Future Volume (veh/h)	230	465	5	9	612	355	10	10	19	138	2	57
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	250	505	5	10	665	386	11	11	21	107	62	62
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	158	960	10	105	841	376	216	216	376	422	203	203
Arrive On Green	0.09	0.26	0.26	0.06	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3734	37	1845	3681	1647	945	945	1647	1845	890	890
Grp Volume(v), veh/h	250	249	261	10	665	386	22	0	21	107	0	124
Grp Sat Flow(s),veh/h/ln	1845	1840	1931	1845	1840	1647	1890	0	1647	1845	0	1780
Q Serve(g_s), s	6.0	8.1	8.1	0.4	11.9	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Cycle Q Clear(g_c), s	6.0	8.1	8.1	0.4	11.9	16.0	0.6	0.0	0.7	3.3	0.0	4.0
Prop In Lane	1.00		0.02	1.00		1.00	0.50		1.00	1.00		0.50
Lane Grp Cap(c), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
V/C Ratio(X)	1.58	0.53	0.53	0.09	0.79	1.03	0.05	0.00	0.06	0.25	0.00	0.30
Avail Cap(c_a), veh/h	158	473	496	105	841	376	432	0	376	422	0	407
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.0	22.3	22.3	31.3	25.4	27.0	21.1	0.0	21.1	22.1	0.0	22.4
Incr Delay (d2), s/veh	289.4	4.1	4.0	1.8	7.5	53.1	0.2	0.0	0.3	1.4	0.0	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	15.7	4.6	4.8	0.2	6.9	12.8	0.4	0.0	0.3	1.9	0.0	2.2
LnGrp Delay(d),s/veh	321.4	26.5	26.3	33.1	32.9	80.1	21.3	0.0	21.4	23.6	0.0	24.3
LnGrp LOS	F	C	C	C	C	F	C		C	C		C
Approach Vol, veh/h		760			1061			43			231	
Approach Delay, s/veh		123.4			50.1			21.3			24.0	
Approach LOS		F			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	10.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.7	2.4	10.1		6.0	8.0	18.0
Green Ext Time (p_c), s		0.1	0.0	1.9		0.7	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	73.2
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	492	362	132	894	400	422	443	376	422	443	376
Arrive On Green	0.02	0.08	0.08	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	2026	1489	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	388	355	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1674	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.1	14.6	14.7	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.1	14.6	14.7	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		0.89	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.87	0.87	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	447	407	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	31.1	31.1	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	19.8	22.1	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	9.9	9.3	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	53.4	50.8	53.2	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	D	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		52.1			43.4			27.3			30.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	16.7		11.8	5.1	17.8
Green Ext Time (p_c), s		1.3	0.0	0.2		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	40.0
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Future Vol, veh/h	25	86	7	16	65	39	2	5	6	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	93	8	17	71	42	2	5	7	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.8	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	15%	21%	13%
Vol Thru, %	38%	73%	54%
Vol Right, %	46%	6%	33%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	13	118	120
LT Vol	2	25	16
Through Vol	5	86	65
RT Vol	6	7	39
Lane Flow Rate	14	128	130
Geometry Grp	1	1	1
Degree of Util (X)	0.017	0.145	0.141
Departure Headway (Hd)	4.232	4.064	3.887
Convergence, Y/N	Yes	Yes	Yes
Cap	851	881	920
Service Time	2.232	2.093	1.921
HCM Lane V/C Ratio	0.016	0.145	0.141
HCM Control Delay	7.3	7.8	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.5

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Future Vol, veh/h	0	148	69	50	59	0	0	0	0	17	0	55
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	161	75	54	64	0	0	0	0	18	0	60

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	161	0	0			333	333	64
Stage 1	-	-	-	-	-	-			172	172	-
Stage 2	-	-	-	-	-	-			161	161	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1418	-	0			662	587	1000
Stage 1	0	-	-	-	-	0			858	756	-
Stage 2	0	-	-	-	-	0			868	765	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1418	-	-			636	0	1000
Mov Cap-2 Maneuver	-	-	-	-	-	-			636	0	-
Stage 1	-	-	-	-	-	-			825	0	-
Stage 2	-	-	-	-	-	-			868	0	-

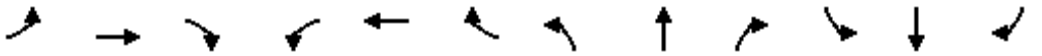
Approach	EB	WB	SB
HCM Control Delay, s	0	3.5	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1418	-	636	1000
HCM Lane V/C Ratio	-	-	0.038	-	0.029	0.06
HCM Control Delay (s)	-	-	7.6	0	10.8	8.8
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	518	201	1018	1229	17	967
Future Volume (veh/h)	518	201	1018	1229	17	967
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	563	0	1107	1336	18	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	883	395	1384	1317	394	618
Arrive On Green	0.24	0.00	0.39	0.68	0.21	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	563	0	1107	1336	18	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	10.3	0.0	20.6	51.0	0.6	0.0
Cycle Q Clear(g_c), s	10.3	0.0	20.6	51.0	0.6	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	883	395	1384	1317	394	618
V/C Ratio(X)	0.64	0.00	0.80	1.01	0.05	0.00
Avail Cap(c_a), veh/h	883	395	1384	1317	394	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.6	0.0	20.4	12.0	23.4	0.0
Incr Delay (d2), s/veh	3.5	0.0	4.9	28.4	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.7	0.0	11.1	36.7	0.3	0.0
LnGrp Delay(d),s/veh	29.1	0.0	25.4	40.4	23.7	0.0
LnGrp LOS	C		C	F	C	
Approach Vol, veh/h	563			2443	18	
Approach Delay, s/veh	29.1			33.6	23.7	
Approach LOS	C			C	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	33.0	22.0				55.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	29.0	18.0				51.0
Max Q Clear Time (g_c+I1), s		2.6	22.6	12.3				53.0
Green Ext Time (p_c), s		0.0	2.6	1.8				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	32.7
HCM 2010 LOS	C



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	107	194	477	307	1656	215	37	179	119	73	77
Future Volume (vph)	270	107	194	477	307	1656	215	37	179	119	73	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3019	1441		1786	1583		1807	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3019	1441		1786	1583		1807	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	293	116	211	518	334	1800	234	40	195	129	79	84
RTOR Reduction (vph)	0	0	190	0	491	503	0	0	117	0	0	70
Lane Group Flow (vph)	293	116	21	518	743	397	0	274	78	0	208	14
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	16.9	9.8	9.8	33.7	28.2	28.2		21.2	21.2		17.0	17.0
Effective Green, g (s)	16.9	9.8	9.8	33.7	28.2	28.2		21.2	21.2		17.0	17.0
Actuated g/C Ratio	0.17	0.10	0.10	0.34	0.28	0.28		0.21	0.21		0.17	0.17
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	299	182	155	596	851	406		378	335		307	269
v/s Ratio Prot	0.17	0.06		c0.29	0.25			c0.15			c0.12	
v/s Ratio Perm			0.01			c0.28			0.05			0.01
v/c Ratio	0.98	0.64	0.13	0.87	0.98dr	0.98		0.72	0.23		0.68	0.05
Uniform Delay, d1	41.4	43.4	41.2	31.1	34.2	35.6		36.7	32.7		38.9	34.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	46.0	5.3	0.1	12.8	9.5	38.5		11.5	1.6		11.4	0.4
Delay (s)	87.3	48.7	41.4	43.9	43.7	74.1		48.2	34.3		50.3	35.1
Level of Service	F	D	D	D	D	E		D	C		D	D
Approach Delay (s)		64.5			54.1			42.4			46.0	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	53.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.3
Intersection Capacity Utilization	108.1%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	661	0	327	0	0	443	674	0	563	568	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	0	0	0	0	733	0	355	0	0	491	747	0	624	630	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929		4.6453	4.3276			4.3276		4.6453	4.3276	
Follow-Up Headway (s)		3.1858		2.6667	2.5352			2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		0		0	733	355		491	747	624	630	
Entry Volume veh/h		0		0	719	355		481	732	612	618	
Circulating Flow (v_c), pc/h	1987			491			624			733		
Exiting Flow (v_{ex}), pc/h	624			0			491			1363		
Capacity (c_{pce}), pc/h		155		859	935			835		688	762	
Capacity (c), veh/h		152		842	917			819		674	747	
v/c Ratio (x)		0.00		0.00	0.78			0.59		0.91	0.83	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.7		4.3	20.4	0.0		13.4	0.0	40.1	27.6	
Lane LOS		C		A	C	A		B	A	E	D	
95% Queue, veh		0.0		0.0	8.2			3.9		11.7	9.2	
Approach Delay, s/veh				13.7			5.3			33.8		
Approach LOS				B			A			D		
Intersection Delay, s/veh | LOS	17.8						C					

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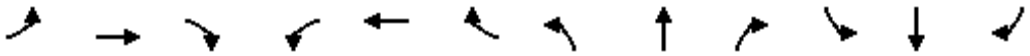

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	21	11	92	36	158	18	105	97	182	142	12
Future Volume (vph)	0	21	11	92	36	158	18	105	97	182	142	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	12	100	39	172	20	114	105	198	154	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	35	311	239	365
Volume Left (vph)	0	100	20	198
Volume Right (vph)	12	172	105	13
Hadj (s)	-0.17	-0.23	-0.21	0.12
Departure Headway (s)	6.0	5.3	5.3	5.4
Degree Utilization, x	0.06	0.46	0.35	0.55
Capacity (veh/h)	491	625	628	637
Control Delay (s)	9.3	12.8	11.0	14.6
Approach Delay (s)	9.3	12.8	11.0	14.6
Approach LOS	A	B	B	B

Intersection Summary				
Delay	12.9			
Level of Service	B			
Intersection Capacity Utilization	64.1%	ICU Level of Service	C	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Surfrider Way
E/W Street Name	Surfrider Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	1
Lane Assignment			LTR				LTR				LTR		LT		R	
Volume (V), veh/h	0	245	81	102	0	17	71	43	0	72	721	27	0	69	729	177
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	272	90	113	0	19	79	48	0	80	799	30	0	76	808	196
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929		4.5436	4.5436	
Follow-Up Headway (s)		3.1858			3.1858			3.1858		2.5352	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		475			146			909		884	196	
Entry Volume veh/h		466			143			891		867	192	
Circulating Flow (v_c), pc/h	903			1151			438			178		
Exiting Flow (v_{ex}), pc/h	196			355			1119			940		
Capacity (c_{pce}), pc/h		458			357			729		1208	1208	
Capacity (c), veh/h		449			350			715		1184	1184	
v/c Ratio (x)		1.04			0.41			1.25		0.73	0.16	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		83.1			19.2			142.3		14.5	4.4	
Lane LOS		F			C			F		B	A	
95% Queue, veh		14.3			1.9			32.4		7.0	0.6	
Approach Delay, s/veh	83.1			19.2			142.3			12.7		
Approach LOS	F			C			F			B		
Intersection Delay, s/veh | LOS	71.0						F					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Civic Center Drive
Agency or Co.	IBI Group	E/W Street Name	Civic Center Drive
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	36	38	32	0	36	45	76	0	27	730	65	0	42	762	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	40	42	35	0	40	50	84	0	30	809	72	0	47	845	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		117			174			911			925	
Entry Volume veh/h		115			171			893			907	
Circulating Flow (v_c), pc/h	932			879			129			120		
Exiting Flow (v_{ex}), pc/h	161			113			933			920		
Capacity (c_{pce}), pc/h		445			469			993			1002	
Capacity (c), veh/h		436			460			974			983	
v/c Ratio (x)		0.26			0.37			0.92			0.92	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		12.5			14.2			32.9			33.6	
Lane LOS		B			B			D			D	
95% Queue, veh		1.0			1.7			13.9			14.3	
Approach Delay, s/veh	12.5			14.2			32.9			33.6		
Approach LOS	B			B			D			D		
Intersection Delay, s/veh | LOS	30.6						D					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Pier View Way
Agency or Co.	IBI Group	E/W Street Name	Pier View Way
Date Performed	7/11/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	72	27	79	0	4	27	10	0	60	810	9	0	5	810	136
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	80	30	88	0	4	30	11	0	67	898	10	0	6	898	151
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		198			45			975			1055	
Entry Volume veh/h		194			44			956			1034	
Circulating Flow (v_c), pc/h		908			1045			116			101	
Exiting Flow (v_{ex}), pc/h		46			248			989			990	
Capacity (c_{pce}), pc/h		456			397			1006			1021	
Capacity (c), veh/h		447			390			987			1001	
v/c Ratio (x)		0.43			0.11			0.97			1.03	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		16.3			11.0			42.0			57.5	
Lane LOS		C			B			E			F	
95% Queue, veh		2.2			0.4			17.1			21.9	
Approach Delay, s/veh	16.3			11.0			42.0			57.5		
Approach LOS	C			B			E			F		
Intersection Delay, s/veh | LOS	46.4						E					

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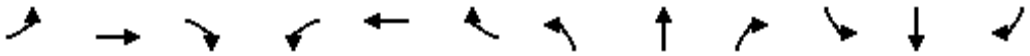


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	15	8	117	57	8	14	40	405	27	14	364	12
Future Volume (vph)	15	8	117	57	8	14	40	405	27	14	364	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	9	127	62	9	15	43	440	29	15	396	13

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	25	127	86	263	249	213	211
Volume Left (vph)	16	0	62	43	0	15	0
Volume Right (vph)	0	127	15	0	29	0	13
Hadj (s)	0.35	-0.67	0.07	0.12	-0.05	0.07	-0.01
Departure Headway (s)	7.3	6.2	7.0	6.0	5.8	6.0	5.9
Degree Utilization, x	0.05	0.22	0.17	0.44	0.40	0.36	0.35
Capacity (veh/h)	453	527	472	586	601	575	583
Control Delay (s)	9.5	9.8	11.3	12.3	11.4	11.1	10.9
Approach Delay (s)	9.7		11.3	11.9		11.0	
Approach LOS	A		B	B		B	

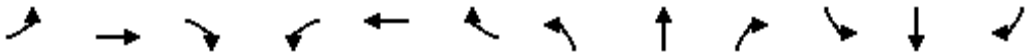
Intersection Summary				
Delay	11.3			
Level of Service	B			
Intersection Capacity Utilization	45.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	284	100	186	197	73	218
Future Volume (vph)	284	100	186	197	73	218
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	309	109	202	214	79	237

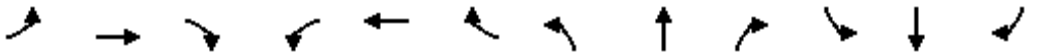
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	309	109	416	316
Volume Left (vph)	309	0	0	79
Volume Right (vph)	0	109	214	0
Hadj (s)	0.53	-0.67	-0.27	0.08
Departure Headway (s)	7.1	5.8	5.5	6.0
Degree Utilization, x	0.61	0.18	0.64	0.53
Capacity (veh/h)	489	586	626	574
Control Delay (s)	19.1	8.9	17.6	15.4
Approach Delay (s)	16.4		17.6	15.4
Approach LOS	C		C	C

Intersection Summary			
Delay	16.6		
Level of Service	C		
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	322	83	294	89	0	0	0	0	131	94
Future Volume (vph)	45	0	322	83	294	89	0	0	0	0	131	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.94	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3416						3317	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3416						3317	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	0	350	90	320	97	0	0	0	0	142	102
RTOR Reduction (vph)	0	0	307	43	34	0	0	0	0	0	88	0
Lane Group Flow (vph)	49	0	43	47	383	0	0	0	0	0	156	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	7.3		7.3	31.2	31.2						8.0	
Effective Green, g (s)	7.3		7.3	31.2	31.2						8.0	
Actuated g/C Ratio	0.12		0.12	0.52	0.52						0.13	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	215		339	920	1776						442	
v/s Ratio Prot	c0.03		0.02	0.03	c0.11						c0.05	
v/s Ratio Perm												
v/c Ratio	0.23		0.13	0.05	0.22						0.35	
Uniform Delay, d1	23.8		23.5	7.1	7.8						23.6	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.5		0.2	0.1	0.3						0.5	
Delay (s)	24.3		23.7	7.2	8.1						24.1	
Level of Service	C		C	A	A						C	
Approach Delay (s)		23.8			7.9			0.0			24.1	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.24		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	33.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	193	443	72	272	743	0	0	602	199
Future Volume (vph)	0	0	0	193	443	72	272	743	0	0	602	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1519	1770	1863			1759	1454
Flt Permitted				0.95	1.00	1.00	0.12	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1519	219	1863			1759	1454
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	210	482	78	296	808	0	0	654	216
RTOR Reduction (vph)	0	0	0	0	0	60	0	0	0	0	1	59
Lane Group Flow (vph)	0	0	0	210	482	18	296	808	0	0	675	135
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.0	18.0	18.0	48.4	48.4			29.0	29.0
Effective Green, g (s)				18.0	18.0	18.0	48.4	48.4			29.0	29.0
Actuated g/C Ratio				0.24	0.24	0.24	0.63	0.63			0.38	0.38
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				417	833	357	431	1180			667	551
v/s Ratio Prot				0.12	c0.14		0.13	c0.43			c0.38	
v/s Ratio Perm						0.01	0.31					0.09
v/c Ratio				0.50	0.58	0.05	0.69	0.68			1.01	0.25
Uniform Delay, d1				25.3	25.8	22.6	23.7	9.1			23.7	16.2
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				4.3	2.9	0.3	4.9	1.8			37.8	0.3
Delay (s)				29.6	28.8	22.9	28.6	10.9			61.5	16.5
Level of Service				C	C	C	C	B			E	B
Approach Delay (s)		0.0			28.4			15.6			51.4	
Approach LOS		A			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	30.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	76.4	Sum of lost time (s)	15.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

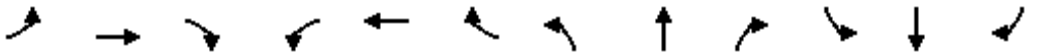
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	145	0	132	715	295	16	83	317	411	55	22
Future Volume (vph)	19	145	0	132	715	295	16	83	317	411	55	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539		1770	3539	1583		1848	1583	1681	1688	
Flt Permitted	0.26	1.00		0.65	1.00	1.00		0.94	1.00	0.69	0.73	
Satd. Flow (perm)	488	3539		1214	3539	1583		1754	1583	1217	1275	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	158	0	143	777	321	17	90	345	447	60	24
RTOR Reduction (vph)	0	0	0	0	0	206	0	0	184	0	6	0
Lane Group Flow (vph)	21	158	0	143	777	115	0	107	161	259	266	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	20.1	20.1		19.7	19.7	19.7		25.7	25.7	25.7	25.7	
Effective Green, g (s)	20.1	20.1		19.7	19.7	19.7		25.7	25.7	25.7	25.7	
Actuated g/C Ratio	0.37	0.37		0.36	0.36	0.36		0.47	0.47	0.47	0.47	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	178	1293		434	1267	567		819	739	568	595	
v/s Ratio Prot		0.04			c0.22							
v/s Ratio Perm	0.04			0.12		0.07		0.06	0.10	c0.21	0.21	
v/c Ratio	0.12	0.12		0.33	0.61	0.20		0.13	0.22	0.46	0.45	
Uniform Delay, d1	11.6	11.6		12.8	14.5	12.2		8.3	8.7	9.9	9.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.5	0.9	0.2		0.3	0.7	2.6	2.4	
Delay (s)	12.0	11.6		13.4	15.4	12.4		8.6	9.4	12.5	12.3	
Level of Service	B	B		B	B	B		A	A	B	B	
Approach Delay (s)		11.7			14.4			9.2			12.4	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	281	16	25	58	26	32
Future Volume (Veh/h)	281	16	25	58	26	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	305	17	27	63	28	35
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			322		430	314
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			322		430	314
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		95	95
cM capacity (veh/h)			1238		569	727

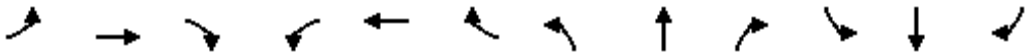
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	322	90	63
Volume Left	0	27	28
Volume Right	17	0	35
cSH	1700	1238	647
Volume to Capacity	0.19	0.02	0.10
Queue Length 95th (ft)	0	2	8
Control Delay (s)	0.0	2.5	11.2
Lane LOS		A	B
Approach Delay (s)	0.0	2.5	11.2
Approach LOS			B

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	33.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	368	210	234	0	0	0	97	492	145	155	422	120
Future Volume (vph)	368	210	234	0	0	0	97	492	145	155	422	120
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.94				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1493				1770	1863	1552	1770	1863	1516
Flt Permitted	0.95	1.00	1.00				0.50	1.00	1.00	0.21	1.00	1.00
Satd. Flow (perm)	1770	1863	1493				929	1863	1552	383	1863	1516
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	400	228	254	0	0	0	105	535	158	168	459	130
RTOR Reduction (vph)	0	0	165	0	0	0	0	0	84	0	0	65
Lane Group Flow (vph)	400	228	89	0	0	0	105	535	74	168	459	65
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	21.0	21.0	21.0				23.0	23.0	23.0	30.2	30.2	30.2
Effective Green, g (s)	21.0	21.0	21.0				23.0	23.0	23.0	30.2	30.2	30.2
Actuated g/C Ratio	0.35	0.35	0.35				0.38	0.38	0.38	0.50	0.50	0.50
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	619	652	522				356	714	594	266	937	763
v/s Ratio Prot	c0.23	0.12						c0.29		0.03	c0.25	
v/s Ratio Perm			0.06				0.11		0.05	0.28		0.04
v/c Ratio	0.65	0.35	0.17				0.29	0.75	0.12	0.63	0.49	0.09
Uniform Delay, d1	16.4	14.4	13.5				12.9	16.0	12.0	10.5	9.8	7.7
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.1	1.5	0.7				2.1	7.1	0.4	4.8	1.8	0.2
Delay (s)	21.5	15.9	14.2				15.0	23.1	12.4	15.3	11.7	8.0
Level of Service	C	B	B				B	C	B	B	B	A
Approach Delay (s)		18.0			0.0			19.9			11.8	
Approach LOS		B			A			B			B	

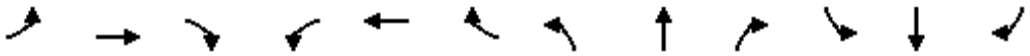
Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	530	35	0	0	0	0	10	35	30	28	0
Future Volume (Veh/h)	16	530	35	0	0	0	0	10	35	30	28	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	576	38	0	0	0	0	11	38	33	30	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			614			644	629	307	366	648	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			614			644	629	307	366	648	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	94	92	100
cM capacity (veh/h)	1622			961			334	393	689	519	384	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	305	326	49	63
Volume Left	17	0	0	33
Volume Right	0	38	38	0
cSH	1622	1700	590	444
Volume to Capacity	0.01	0.19	0.08	0.14
Queue Length 95th (ft)	1	0	7	12
Control Delay (s)	0.5	0.0	11.7	14.4
Lane LOS	A		B	B
Approach Delay (s)	0.2		11.7	14.4
Approach LOS			B	B

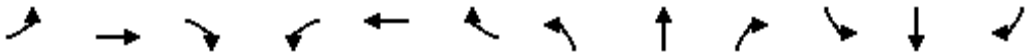
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	32.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Future Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	1248	26	0	0	0	0	14	34	61	53	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	664	650	48	114
Volume Left (vph)	40	0	0	61
Volume Right (vph)	0	26	34	0
Hadj (s)	0.06	0.01	-0.39	0.14
Departure Headway (s)	5.1	5.0	5.6	6.0
Degree Utilization, x	0.93	0.90	0.08	0.19
Capacity (veh/h)	702	714	628	586
Control Delay (s)	40.6	35.3	9.1	10.5
Approach Delay (s)	38.0		9.1	10.5
Approach LOS	E		A	B

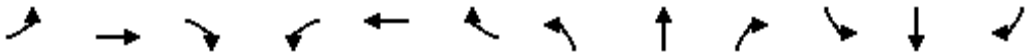
Intersection Summary				
Delay	34.9			
Level of Service	D			
Intersection Capacity Utilization	52.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	271	479	13	42	0	20	0	19	12	0	0	0
Future Volume (vph)	271	479	13	42	0	20	0	19	12	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	295	521	14	46	0	22	0	21	13	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	295	535	68	34
Volume Left (vph)	295	0	46	0
Volume Right (vph)	0	14	22	13
Hadj (s)	0.53	0.02	-0.02	-0.20
Departure Headway (s)	5.2	4.7	4.7	5.4
Degree Utilization, x	0.42	0.69	0.09	0.05
Capacity (veh/h)	690	767	737	623
Control Delay (s)	10.8	16.3	8.2	8.7
Approach Delay (s)	14.3		8.2	8.7
Approach LOS	B		A	A

Intersection Summary				
Delay	13.7			
Level of Service	B			
Intersection Capacity Utilization	42.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	38	0	0	31	17	576	45	22	527	18
Future Volume (Veh/h)	0	0	38	0	0	31	17	576	45	22	527	18
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	41	0	0	34	18	626	49	24	573	20
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked	0.87	0.87	0.83	0.87	0.87	0.92	0.83			0.92		
vC, conflicting volume	1334	1356	590	1356	1342	658	600			682		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1106	1132	399	1131	1115	587	411			613		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	93	98			97		
cM capacity (veh/h)	143	166	535	137	169	467	943			884		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	41	34	18	675	24	593
Volume Left	0	0	18	0	24	0
Volume Right	41	34	0	49	0	20
cSH	535	467	943	1700	884	1700
Volume to Capacity	0.08	0.07	0.02	0.40	0.03	0.35
Queue Length 95th (ft)	6	6	1	0	2	0
Control Delay (s)	12.3	13.3	8.9	0.0	9.2	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.3	13.3	0.2		0.4	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	43.1%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	14	0	71	0	45	10	13	0	46	577	20	0	25	524	61
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	16	0	79	0	50	11	14	0	51	640	22	0	28	581	68
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		95			75			713			677	
Entry Volume veh/h		93			74			699			664	
Circulating Flow (v_c), pc/h	659			707			44			112		
Exiting Flow (v_{ex}), pc/h	50			130			670			710		
Capacity (c_{pce}), pc/h		585			557			1081			1010	
Capacity (c), veh/h		573			546			1060			990	
v/c Ratio (x)		0.16			0.13			0.66			0.67	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.3			8.3			13.0			14.0	
Lane LOS		A			A			B			B	
95% Queue, veh		0.6			0.5			5.2			5.4	
Approach Delay, s/veh	8.3			8.3			13.0			14.0		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh | LOS	12.9						B					

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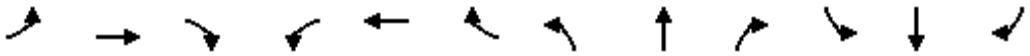
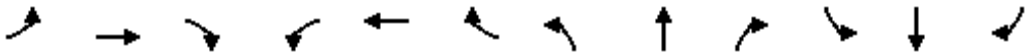


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	49	76	31	91	6	137	4	287	73	163	177	3
Future Volume (vph)	49	76	31	91	6	137	4	287	73	163	177	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	83	34	99	7	149	4	312	79	177	192	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	170	255	395	372
Volume Left (vph)	53	99	4	177
Volume Right (vph)	34	149	79	3
Hadj (s)	-0.02	-0.24	-0.08	0.12
Departure Headway (s)	7.0	6.5	6.1	6.3
Degree Utilization, x	0.33	0.46	0.67	0.65
Capacity (veh/h)	431	485	559	532
Control Delay (s)	13.3	14.9	20.4	20.4
Approach Delay (s)	13.3	14.9	20.4	20.4
Approach LOS	B	B	C	C

Intersection Summary				
Delay	18.2			
Level of Service	C			
Intersection Capacity Utilization	68.1%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	334	48	21	233	38	45	70	71	30	94	15
Future Volume (Veh/h)	13	334	48	21	233	38	45	70	71	30	94	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	363	52	23	253	41	49	76	77	33	102	16
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked	0.98						0.98	0.98		0.98	0.98	0.98
vC, conflicting volume	308			422			812	778	396	866	784	288
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	280			422			795	761	396	850	766	260
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			76	76	88	82	67	98
cM capacity (veh/h)	1239			1131			208	312	650	187	309	751

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	429	317	202	151
Volume Left	14	23	49	33
Volume Right	52	41	77	16
cSH	1239	1131	338	286
Volume to Capacity	0.01	0.02	0.60	0.53
Queue Length 95th (ft)	1	2	92	72
Control Delay (s)	0.4	0.8	30.3	30.8
Lane LOS	A	A	D	D
Approach Delay (s)	0.4	0.8	30.3	30.8
Approach LOS			D	D

Intersection Summary			
Average Delay	10.2		
Intersection Capacity Utilization	45.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	101	124	179	0	118	99	21	0	157	568	128	0	23	568	50
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	112	137	198	0	131	110	23	0	174	630	142	0	26	630	55
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		447			264			946			711	
Entry Volume veh/h		438			259			927			697	
Circulating Flow (v_c), pc/h		787			916			275			415	
Exiting Flow (v_{ex}), pc/h		305			339			765			959	
Capacity (c_{pce}), pc/h		514			452			858			746	
Capacity (c), veh/h		504			443			841			732	
v/c Ratio (x)		0.87			0.58			1.10			0.95	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		42.5			21.8			83.7			46.2	
Lane LOS		E			C			F			E	
95% Queue, veh		9.3			3.6			24.8			14.2	
Approach Delay, s/veh	42.5			21.8			83.7			46.2		
Approach LOS	E			C			F			E		
Intersection Delay, s/veh | LOS	57.8						F					

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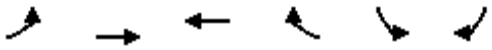
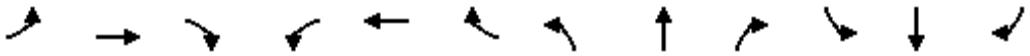


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	433	322	23	34	36
Future Volume (Veh/h)	8	433	322	23	34	36
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	471	350	25	37	39
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	383				860	372
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	383				860	372
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				88	94
cM capacity (veh/h)	1168				321	669

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	480	375	76
Volume Left	9	0	37
Volume Right	0	25	39
cSH	1168	1700	438
Volume to Capacity	0.01	0.22	0.17
Queue Length 95th (ft)	1	0	16
Control Delay (s)	0.2	0.0	14.9
Lane LOS	A		B
Approach Delay (s)	0.2	0.0	14.9
Approach LOS			B

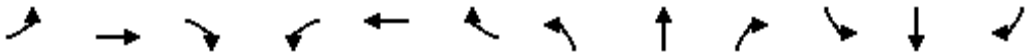
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	40.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	443	4	2	296	27	2	1	3	41	0	33
Future Volume (Veh/h)	24	443	4	2	296	27	2	1	3	41	0	33
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	482	4	2	322	29	2	1	3	45	0	36
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	353			486			914	893	484	882	880	340
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	353			486			914	893	484	882	880	340
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			100			99	100	99	83	100	95
cM capacity (veh/h)	1204			1077			236	274	583	259	278	700

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	512	353	6	81
Volume Left	26	2	2	45
Volume Right	4	29	3	36
cSH	1204	1077	347	360
Volume to Capacity	0.02	0.00	0.02	0.23
Queue Length 95th (ft)	2	0	1	21
Control Delay (s)	0.6	0.1	15.6	17.9
Lane LOS	A	A	C	C
Approach Delay (s)	0.6	0.1	15.6	17.9
Approach LOS			C	C

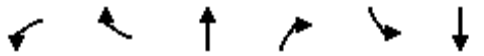
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	54.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	265	266	80	192	0	158	0	111	0	0	0
Future Volume (vph)	0	265	266	80	192	0	158	0	111	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	288	289	87	209	0	172	0	121	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	577	296	293	0
Volume Left (vph)	0	87	172	0
Volume Right (vph)	289	0	121	0
Hadj (s)	-0.27	0.09	-0.10	0.00
Departure Headway (s)	5.1	5.8	6.0	7.0
Degree Utilization, x	0.82	0.48	0.49	0.00
Capacity (veh/h)	690	589	560	444
Control Delay (s)	26.5	14.0	14.7	10.0
Approach Delay (s)	26.5	14.0	14.7	0.0
Approach LOS	D	B	B	A

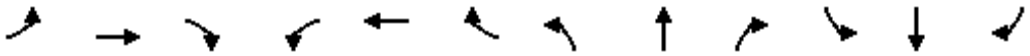
Intersection Summary				
Delay	20.4			
Level of Service	C			
Intersection Capacity Utilization	76.0%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	69	135	219	101	98	214
Future Volume (vph)	69	135	219	101	98	214
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	75	147	238	110	107	233

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	222	348	340
Volume Left (vph)	75	0	107
Volume Right (vph)	147	110	0
Hadj (s)	-0.30	-0.16	0.10
Departure Headway (s)	5.2	4.8	5.1
Degree Utilization, x	0.32	0.47	0.48
Capacity (veh/h)	622	715	679
Control Delay (s)	10.7	12.0	12.6
Approach Delay (s)	10.7	12.0	12.6
Approach LOS	B	B	B

Intersection Summary			
Delay	11.9		
Level of Service	B		
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	358	21	20	296	77	29	46	38	84	28	23
Future Volume (Veh/h)	15	358	21	20	296	77	29	46	38	84	28	23
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	389	23	22	322	84	32	50	41	91	30	25
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.87						0.87	0.87		0.87	0.87	0.87
vC, conflicting volume	409			423			896	896	420	918	866	371
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	242			423			803	804	420	828	769	198
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			86	81	93	53	89	97
cM capacity (veh/h)	1146			1126			221	262	624	192	275	727

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	428	428	123	146
Volume Left	16	22	32	91
Volume Right	23	84	41	25
cSH	1146	1126	307	237
Volume to Capacity	0.01	0.02	0.40	0.62
Queue Length 95th (ft)	1	1	46	91
Control Delay (s)	0.5	0.6	24.4	42.0
Lane LOS	A	A	C	E
Approach Delay (s)	0.5	0.6	24.4	42.0
Approach LOS			C	E

Intersection Summary				
Average Delay	8.5			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Oceanside Blvd
E/W Street Name	Oceanside Boulevard
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	56	218	87	0	261	212	218	0	92	646	168	0	225	549	30
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	62	242	96	0	289	235	242	0	102	716	186	0	249	609	33
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		400			766			1004			891	
Entry Volume veh/h		392			751			984			874	
Circulating Flow (v_c), pc/h	1147			880			553			626		
Exiting Flow (v_{ex}), pc/h	677			370			1020			994		
Capacity (c_{pce}), pc/h		359			469			650			604	
Capacity (c), veh/h		352			460			637			592	
v/c Ratio (x)		1.11			1.63			1.54			1.47	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		117.1			317.2			270.8			242.1	
Lane LOS		F			F			F			F	
95% Queue, veh		14.9			43.0			50.7			42.8	
Approach Delay, s/veh	117.1			317.2			270.8			242.1		
Approach LOS	F			F			F			F		
Intersection Delay, s/veh | LOS	254.0						F					

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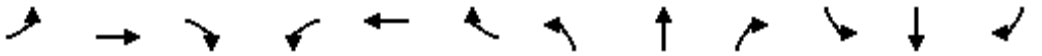

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	606	6	22	674	178	9	16	57	333	13	82
Future Volume (vph)	41	606	6	22	674	178	9	16	57	333	13	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3532		1761	3418			3119			1776	1527
Flt Permitted	0.21	1.00		0.32	1.00			0.92			0.67	1.00
Satd. Flow (perm)	382	3532		584	3418			2876			1241	1527
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	659	7	24	733	193	10	17	62	362	14	89
RTOR Reduction (vph)	0	1	0	0	48	0	0	33	0	0	0	47
Lane Group Flow (vph)	45	665	0	24	878	0	0	56	0	0	376	42
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	19.5	19.5		19.5	19.5			26.0			26.0	26.0
Effective Green, g (s)	19.5	19.5		19.5	19.5			26.0			26.0	26.0
Actuated g/C Ratio	0.35	0.35		0.35	0.35			0.47			0.47	0.47
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	135	1252		207	1211			1359			586	721
v/s Ratio Prot		0.19			c0.26							
v/s Ratio Perm	0.12			0.04				0.02			c0.30	0.03
v/c Ratio	0.33	0.53		0.12	0.73			0.04			0.64	0.06
Uniform Delay, d1	13.0	14.1		11.9	15.4			7.8			11.0	7.9
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	1.5	0.4		0.3	2.2			0.1			5.3	0.2
Delay (s)	14.5	14.5		12.2	17.6			7.9			16.3	8.0
Level of Service	B	B		B	B			A			B	A
Approach Delay (s)		14.5			17.5			7.9			14.7	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Morse Street
Agency or Co.	IBI Group	E/W Street Name	Morse Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	42	16	15	0	56	16	190	0	20	846	103	0	243	881	19
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	47	18	17	0	62	18	211	0	22	938	114	0	269	977	21
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		82			291			1074			1267	
Entry Volume veh/h		80			285			1053			1242	
Circulating Flow (v_c), pc/h	1308			1007			334			102		
Exiting Flow (v_{ex}), pc/h	401			61			1196			1056		
Capacity (c_{pce}), pc/h		306			413			809			1020	
Capacity (c), veh/h		300			405			793			1000	
v/c Ratio (x)		0.27			0.70			1.33			1.24	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		17.7			31.1			173.4			133.4	
Lane LOS		C			D			F			F	
95% Queue, veh		1.1			5.3			41.9			41.5	
Approach Delay, s/veh	17.7			31.1			173.4			133.4		
Approach LOS	C			D			F			F		
Intersection Delay, s/veh | LOS	134.8						F					

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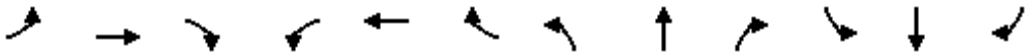
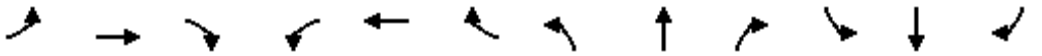


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	325	35	38	197	0	77	0	65	0	0	0
Future Volume (Veh/h)	0	325	35	38	197	0	77	0	65	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	353	38	41	214	0	84	0	71	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	214			391			668	668	372	739	687	214
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	214			391			668	668	372	739	687	214
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			77	100	89	100	100	100
cM capacity (veh/h)	1356			1168			362	366	674	290	357	826

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	391	255	155	0
Volume Left	0	41	84	0
Volume Right	38	0	71	0
cSH	1356	1168	459	1700
Volume to Capacity	0.00	0.04	0.34	0.00
Queue Length 95th (ft)	0	3	37	0
Control Delay (s)	0.0	1.6	16.8	0.0
Lane LOS		A	C	A
Approach Delay (s)	0.0	1.6	16.8	0.0
Approach LOS			C	A

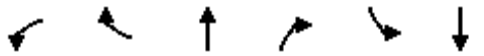
Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	49.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	170	59	0	66	0	59	1	18	0	0	0
Future Volume (Veh/h)	0	170	59	0	66	0	59	1	18	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	185	64	0	72	0	64	1	20	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	72			249			289	289	217	310	321	72
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	72			249			289	289	217	310	321	72
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			90	100	98	100	100	100
cM capacity (veh/h)	1528			1317			663	621	823	627	596	990

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	249	72	85	0
Volume Left	0	0	64	0
Volume Right	64	0	20	0
cSH	1528	1317	694	1700
Volume to Capacity	0.00	0.00	0.12	0.00
Queue Length 95th (ft)	0	0	10	0
Control Delay (s)	0.0	0.0	10.9	0.0
Lane LOS			B	A
Approach Delay (s)	0.0	0.0	10.9	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	23.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	85	302	27	48	361	27
Future Volume (vph)	85	302	27	48	361	27
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	92	328	29	52	392	29

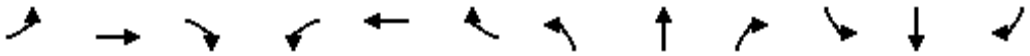
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	420	81	421
Volume Left (vph)	92	0	392
Volume Right (vph)	328	52	0
Hadj (s)	-0.39	-0.35	0.22
Departure Headway (s)	4.9	5.3	5.4
Degree Utilization, x	0.57	0.12	0.63
Capacity (veh/h)	702	608	646
Control Delay (s)	14.2	9.1	17.0
Approach Delay (s)	14.2	9.1	17.0
Approach LOS	B	A	C

Intersection Summary			
Delay	15.0		
Level of Service	B		
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	238	124	17	186	15	169	19	22	4	14	23
Future Volume (Veh/h)	9	238	124	17	186	15	169	19	22	4	14	23
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	259	135	18	202	16	184	21	24	4	15	25
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	218			394			625	600	326	627	660	210
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	218			394			625	600	326	627	660	210
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			50	95	97	99	96	97
cM capacity (veh/h)	1352			1165			367	405	715	361	374	830

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	404	236	229	44
Volume Left	10	18	184	4
Volume Right	135	16	24	25
cSH	1352	1165	390	542
Volume to Capacity	0.01	0.02	0.59	0.08
Queue Length 95th (ft)	1	1	90	7
Control Delay (s)	0.3	0.8	26.5	12.2
Lane LOS	A	A	D	B
Approach Delay (s)	0.3	0.8	26.5	12.2
Approach LOS			D	B

Intersection Summary				
Average Delay	7.5			
Intersection Capacity Utilization	47.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	249	6	18	207	5	4	4	17	2	2	1
Future Volume (Veh/h)	1	249	6	18	207	5	4	4	17	2	2	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	271	7	20	225	5	4	4	18	2	2	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	230			278			546	546	274	564	548	228
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	230			278			546	546	274	564	548	228
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			99	99	98	100	100	100
cM capacity (veh/h)	1338			1285			441	438	764	418	437	812

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	279	250	26	5
Volume Left	1	20	4	2
Volume Right	7	5	18	1
cSH	1338	1285	622	472
Volume to Capacity	0.00	0.02	0.04	0.01
Queue Length 95th (ft)	0	1	3	1
Control Delay (s)	0.0	0.8	11.0	12.7
Lane LOS	A	A	B	B
Approach Delay (s)	0.0	0.8	11.0	12.7
Approach LOS			B	B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	34.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Cassidy Street
Agency or Co.	IBI Group	E/W Street Name	Cassidy Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2035	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	135	152	129	0	125	88	31	0	142	817	99	0	123	648	50
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	150	169	143	0	139	98	34	0	157	906	110	0	136	718	55
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			4.9763	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		462			271			1173			909	
Entry Volume veh/h		453			266			1150			891	
Circulating Flow (v_c), pc/h		993			1213			455			394	
Exiting Flow (v_{ex}), pc/h		415			310			1090			1000	
Capacity (c_{pce}), pc/h		419			336			717			923	
Capacity (c), veh/h		410			329			703			905	
v/c Ratio (x)		1.10			0.81			1.64			0.98	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		107.1			48.0			309.0			47.5	
Lane LOS		F			E			F			E	
95% Queue, veh		16.0			6.8			62.8			17.4	
Approach Delay, s/veh	107.1			48.0			309.0			47.5		
Approach LOS	F			E			F			E		
Intersection Delay, s/veh | LOS	166.3						F					

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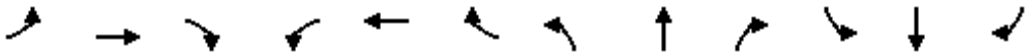
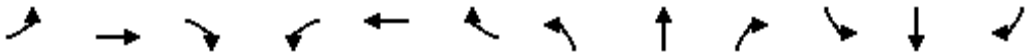


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	24	222	74	72	100	13	85	82	33	21	32	24
Future Volume (Veh/h)	24	222	74	72	100	13	85	82	33	21	32	24
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	241	80	78	109	14	92	89	36	23	35	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	123			321			648	612	281	686	645	116
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	123			321			648	612	281	686	645	116
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			94			72	76	95	91	90	97
cM capacity (veh/h)	1464			1239			324	376	758	265	360	936

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	347	201	217	84
Volume Left	26	78	92	23
Volume Right	80	14	36	26
cSH	1464	1239	382	397
Volume to Capacity	0.02	0.06	0.57	0.21
Queue Length 95th (ft)	1	5	85	20
Control Delay (s)	0.7	3.5	26.1	16.5
Lane LOS	A	A	D	C
Approach Delay (s)	0.7	3.5	26.1	16.5
Approach LOS			D	C

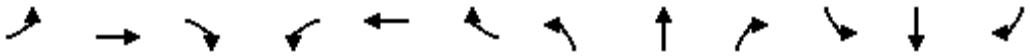
Intersection Summary			
Average Delay	9.4		
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	102	25	30	48	7	33	63	30	9	27	14
Future Volume (vph)	20	102	25	30	48	7	33	63	30	9	27	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	111	27	33	52	8	36	68	33	10	29	15

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	160	93	137	54
Volume Left (vph)	22	33	36	10
Volume Right (vph)	27	8	33	15
Hadj (s)	-0.04	0.05	-0.06	-0.10
Departure Headway (s)	4.4	4.6	4.5	4.6
Degree Utilization, x	0.20	0.12	0.17	0.07
Capacity (veh/h)	777	737	754	730
Control Delay (s)	8.5	8.2	8.4	7.9
Approach Delay (s)	8.5	8.2	8.4	7.9
Approach LOS	A	A	A	A

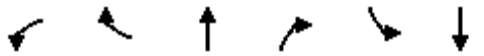
Intersection Summary				
Delay	8.3			
Level of Service	A			
Intersection Capacity Utilization	27.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	167	16	84	72	40	16	110	189	77	23	4
Future Volume (vph)	18	167	16	84	72	40	16	110	189	77	23	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	182	17	91	78	43	17	120	205	84	25	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	219	212	342	113
Volume Left (vph)	20	91	17	84
Volume Right (vph)	17	43	205	4
Hadj (s)	0.01	0.00	-0.32	0.16
Departure Headway (s)	5.5	5.5	5.0	5.8
Degree Utilization, x	0.33	0.32	0.47	0.18
Capacity (veh/h)	599	598	670	546
Control Delay (s)	11.2	11.1	12.4	10.1
Approach Delay (s)	11.2	11.1	12.4	10.1
Approach LOS	B	B	B	B

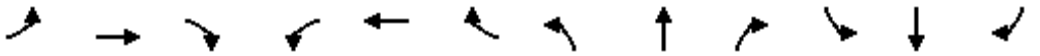
Intersection Summary				
Delay	11.5			
Level of Service	B			
Intersection Capacity Utilization	58.9%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	116	138	9	76	52
Future Volume (vph)	0	116	138	9	76	52
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	126	150	10	83	57

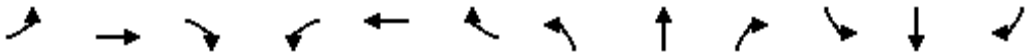
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	126	160	140
Volume Left (vph)	0	0	83
Volume Right (vph)	126	10	0
Hadj (s)	-0.57	0.00	0.15
Departure Headway (s)	4.0	4.3	4.5
Degree Utilization, x	0.14	0.19	0.17
Capacity (veh/h)	829	801	765
Control Delay (s)	7.7	8.4	8.4
Approach Delay (s)	7.7	8.4	8.4
Approach LOS	A	A	A

Intersection Summary			
Delay	8.2		
Level of Service	A		
Intersection Capacity Utilization	21.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	154	50	238	122	409	56	743	316	342	624	28
Future Volume (vph)	23	154	50	238	122	409	56	743	316	342	624	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1556		1803	1794	1770	3785		2006	3986	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1556		1803	1794	1770	3785		2006	3986	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	25	167	54	259	133	445	61	808	343	372	678	30
RTOR Reduction (vph)	0	0	48	0	0	192	0	42	0	0	3	0
Lane Group Flow (vph)	25	167	6	0	392	253	61	1109	0	372	705	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	12.1	12.1	12.1		24.1	44.9	7.0	30.0		20.8	43.8	
Effective Green, g (s)	12.1	12.1	12.1		24.1	44.9	7.0	30.0		20.8	43.8	
Actuated g/C Ratio	0.11	0.11	0.11		0.23	0.42	0.07	0.28		0.20	0.41	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	228	212	177		409	759	116	1070		393	1645	
v/s Ratio Prot	0.01	c0.09			c0.22	0.14	0.03	c0.29		c0.19	0.18	
v/s Ratio Perm			0.00									
v/c Ratio	0.11	0.79	0.03		0.96	0.33	0.53	1.04		0.95	0.43	
Uniform Delay, d1	42.2	45.7	41.8		40.5	20.5	47.9	38.0		42.1	22.2	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	16.2	0.0		33.5	0.3	2.0	37.3		31.7	0.8	
Delay (s)	42.2	61.9	41.8		74.0	20.8	49.9	75.3		73.8	23.0	
Level of Service	D	E	D		E	C	D	E		E	C	
Approach Delay (s)		55.5			45.7			74.1			40.5	
Approach LOS		E			D			E			D	

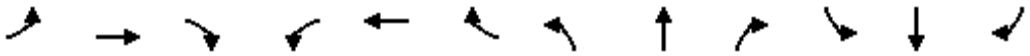
Intersection Summary			
HCM 2000 Control Delay	54.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	106.1	Sum of lost time (s)	19.1
Intersection Capacity Utilization	93.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	893	32	43	859	77	21	0	43	36	14	81
Future Volume (Veh/h)	13	893	32	43	859	77	21	0	43	36	14	81
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	971	35	47	934	84	23	0	47	39	15	88
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	1018			1006			2182	2128	988	2134	2104	976
vC1, stage 1 conf vol							1016	1016		1070	1070	
vC2, stage 2 conf vol							1166	1112		1064	1034	
vCu, unblocked vol	1018			960			2246	2187	941	2193	2160	976
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			93			80	100	84	71	92	71
cM capacity (veh/h)	682			656			116	188	292	135	181	305

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1020	1065	70	142
Volume Left	14	47	23	39
Volume Right	35	84	47	88
cSH	682	656	195	215
Volume to Capacity	0.02	0.07	0.36	0.66
Queue Length 95th (ft)	2	6	38	101
Control Delay (s)	0.7	2.3	33.5	49.4
Lane LOS	A	A	D	E
Approach Delay (s)	0.7	2.3	33.5	49.4
Approach LOS			D	E

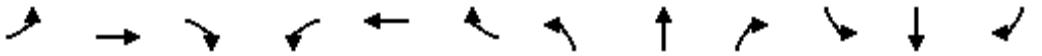
Intersection Summary				
Average Delay	5.5			
Intersection Capacity Utilization	91.4%	ICU Level of Service	F	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	1249	30	72	1228	92	6	5	114	36	5	22
Future Volume (Veh/h)	14	1249	30	72	1228	92	6	5	114	36	5	22
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	1358	33	78	1335	100	7	5	124	39	5	24
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.93			0.93	0.93	0.93	0.93	0.93	
vC, conflicting volume	1435			1392			2924	2996	1376	3056	2963	1386
vC1, stage 1 conf vol							1406	1406		1541	1541	
vC2, stage 2 conf vol							1518	1591		1514	1422	
vCu, unblocked vol	1435			1384			3030	3108	1366	3171	3072	1386
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			83			90	95	26	0	94	86
cM capacity (veh/h)	473			460			73	98	167	1	82	175

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	15	1391	78	1435	136	68
Volume Left	15	0	78	0	7	39
Volume Right	0	33	0	100	124	24
cSH	473	1700	460	1700	153	2
Volume to Capacity	0.03	0.82	0.17	0.84	0.89	31.71
Queue Length 95th (ft)	2	0	15	0	154	Err
Control Delay (s)	12.9	0.0	14.4	0.0	103.4	Err
Lane LOS	B		B		F	F
Approach Delay (s)	0.1		0.7		103.4	Err
Approach LOS					F	F

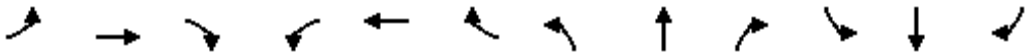
Intersection Summary				
Average Delay	222.6			
Intersection Capacity Utilization	87.1%	ICU Level of Service		E
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	18	1446	0	0	1488	455	0	0	0	0	0	31
Future Volume (Veh/h)	18	1446	0	0	1488	455	0	0	0	0	0	31
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	1572	0	0	1617	495	0	0	0	0	0	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2112			1572			3263	3724	1572	3476	3476	1864
vC1, stage 1 conf vol							1612	1612		1864	1864	
vC2, stage 2 conf vol							1651	2112		1612	1612	
vCu, unblocked vol	2112			1572			3263	3724	1572	3476	3476	1864
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			100			100	100	100	100	100	62
cM capacity (veh/h)	259			419			50	61	136	69	89	91

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	20	1572	0	2112	0	34
Volume Left	20	0	0	0	0	0
Volume Right	0	0	0	495	0	34
cSH	259	1700	1700	1700	1700	91
Volume to Capacity	0.08	0.92	0.00	1.24	0.00	0.38
Queue Length 95th (ft)	6	0	0	0	0	37
Control Delay (s)	20.1	0.0	0.0	0.0	0.0	66.8
Lane LOS	C				A	F
Approach Delay (s)	0.3		0.0		0.0	66.8
Approach LOS					A	F

Intersection Summary				
Average Delay	0.7			
Intersection Capacity Utilization	116.0%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	102	0	0	127	107	994	28	127	797	10
Future Volume (Veh/h)	0	0	102	0	0	127	107	994	28	127	797	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	111	0	0	138	116	1080	30	138	866	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	2058	2490	872	2580	2480	555	877			1110		
vC1, stage 1 conf vol	1148	1148		1327	1327							
vC2, stage 2 conf vol	910	1342		1253	1153							
vCu, unblocked vol	2058	2490	872	2580	2480	555	877			1110		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	62	100	100	71	85			78		
cM capacity (veh/h)	39	46	294	6	83	475	766			625		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	111	138	116	720	390	138	877
Volume Left	0	0	116	0	0	138	0
Volume Right	111	138	0	0	30	0	11
cSH	294	475	766	1700	1700	625	1700
Volume to Capacity	0.38	0.29	0.15	0.42	0.23	0.22	0.52
Queue Length 95th (ft)	42	30	13	0	0	21	0
Control Delay (s)	24.5	15.6	10.5	0.0	0.0	12.4	0.0
Lane LOS	C	C	B			B	
Approach Delay (s)	24.5	15.6	1.0			1.7	
Approach LOS	C	C					

Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	55.5%	ICU Level of Service	B	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Michigan Avenue
Agency or Co.	IBI Group	E/W Street Name	Michigan Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	187	87	79	0	50	11	24	0	25	537	42	0	18	537	48
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	207	96	88	0	55	12	27	0	28	595	47	0	20	595	53
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		391			94			670			668	
Entry Volume veh/h		383			92			657			655	
Circulating Flow (v_c), pc/h		670			830			323			95	
Exiting Flow (v_{ex}), pc/h		163			93			829			738	
Capacity (c_{pce}), pc/h		578			493			818			1028	
Capacity (c), veh/h		567			483			802			1007	
v/c Ratio (x)		0.68			0.19			0.82			0.65	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		22.0			10.2			25.4			13.2	
Lane LOS		C			B			D			B	
95% Queue, veh		5.1			0.7			9.1			5.0	
Approach Delay, s/veh	22.0			10.2			25.4			13.2		
Approach LOS	C			B			D			B		
Intersection Delay, s/veh | LOS	19.4						C					

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HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - West
E/W Street Name	West Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	33	19	36	0	40	19	36	0	36	271	40	0	36	271	33
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	37	21	40	0	44	21	40	0	40	300	44	0	40	300	37
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		98			105			384			377	
Entry Volume veh/h		96			103			376			370	
Circulating Flow (v_c), pc/h	384			377			98			105		
Exiting Flow (v_{ex}), pc/h	105			98			377			384		
Capacity (c_{pce}), pc/h		770			775			1025			1017	
Capacity (c), veh/h		755			760			1004			997	
v/c Ratio (x)		0.13			0.14			0.37			0.37	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.1			6.2			7.6			7.6	
Lane LOS		A			A			A			A	
95% Queue, veh		0.4			0.5			1.8			1.7	
Approach Delay, s/veh	6.1			6.2			7.6			7.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.3						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Kelly
Agency or Co.	IBI Group	E/W Street Name	Kelly Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	28	43	27	0	31	26	197	0	10	317	30	0	180	300	62
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	31	48	30	0	34	29	218	0	11	351	33	0	200	333	69
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		109			281			395			602	
Entry Volume veh/h		107			275			387			590	
Circulating Flow (v_c), pc/h	567			393			279			74		
Exiting Flow (v_{ex}), pc/h	281			109			600			397		
Capacity (c_{pce}), pc/h		641			763			855			1049	
Capacity (c), veh/h		628			748			838			1029	
v/c Ratio (x)		0.17			0.37			0.46			0.57	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.7			9.4			10.2			11.0	
Lane LOS		A			A			B			B	
95% Queue, veh		0.6			1.7			2.5			3.8	
Approach Delay, s/veh	7.7			9.4			10.2			11.0		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh | LOS	10.2						B					

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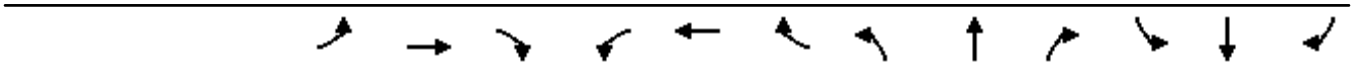


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Future Volume (veh/h)	0	0	0	103	0	14	13	1059	13	24	2213	16
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				112	0	0	14	1151	0	26	2405	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				738	0	329	92	3173	988	92	2208	988
Arrive On Green				0.20	0.00	0.00	0.05	0.60	0.00	0.05	0.60	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				112	0	0	14	1151	0	26	2405	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Cycle Q Clear(g_c), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				738	0	329	92	3173	988	92	2208	988
V/C Ratio(X)				0.15	0.00	0.00	0.15	0.36	0.00	0.28	1.09	0.00
Avail Cap(c_a), veh/h				738	0	329	92	3173	988	92	2208	988
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				26.4	0.0	0.0	36.4	8.2	0.0	36.6	16.0	0.0
Incr Delay (d2), s/veh				0.4	0.0	0.0	3.5	0.3	0.0	7.5	48.3	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.1	0.0	0.0	0.4	4.4	0.0	0.7	38.7	0.0
LnGrp Delay(d),s/veh				26.8	0.0	0.0	39.8	8.5	0.0	44.1	64.3	0.0
LnGrp LOS				C			D	A		D	F	
Approach Vol, veh/h					112			1165			2431	
Approach Delay, s/veh					26.8			8.9			64.1	
Approach LOS					C			A			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	52.0			8.0	52.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	48.0			4.0	48.0		16.0
Max Q Clear Time (g_c+I1), s	3.1	10.9			2.6	50.0		4.0
Green Ext Time (p_c), s	0.0	10.6			0.0	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	45.6
HCM 2010 LOS	D

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1123	209	317	1287	0	0
Future Volume (veh/h)	1123	209	317	1287	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	1221	227	345	1399		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	2116	947	805	3313		
Arrive On Green	0.57	0.57	0.22	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	1221	227	345	1399		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	8.4	2.7	3.3	2.5		
Cycle Q Clear(g_c), s	8.4	2.7	3.3	2.5		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2116	947	805	3313		
V/C Ratio(X)	0.58	0.24	0.43	0.42		
Avail Cap(c_a), veh/h	2116	947	805	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.4	4.2	13.3	0.3		
Incr Delay (d2), s/veh	1.2	0.6	1.7	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.4	1.4	1.8	1.2		
LnGrp Delay(d),s/veh	6.6	4.8	15.0	0.7		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1448			1744		
Approach Delay, s/veh	6.3			3.5		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			13.0	27.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			9.0	23.0				36.0
Max Q Clear Time (g_c+I1), s			5.3	10.4				4.5
Green Ext Time (p_c), s			0.5	7.5				13.7

Intersection Summary	
HCM 2010 Ctrl Delay	4.8
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1740	97	305	1324	156	0
Future Volume (veh/h)	1740	97	305	1324	156	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1891	105	332	1439	170	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1840	823	358	2419	422	376
Arrive On Green	0.50	0.50	0.10	0.66	0.23	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	1891	105	332	1439	170	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	35.0	2.4	6.4	15.4	5.5	0.0
Cycle Q Clear(g_c), s	35.0	2.4	6.4	15.4	5.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1840	823	358	2419	422	376
V/C Ratio(X)	1.03	0.13	0.93	0.59	0.40	0.00
Avail Cap(c_a), veh/h	1840	823	358	2419	422	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.5	9.3	31.2	6.8	22.9	0.0
Incr Delay (d2), s/veh	28.3	0.3	32.3	1.1	2.9	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	24.9	1.2	4.8	8.0	3.1	0.0
LnGrp Delay(d),s/veh	45.8	9.7	63.6	7.8	25.8	0.0
LnGrp LOS	F	A	E	A	C	
Approach Vol, veh/h	1996			1771	170	
Approach Delay, s/veh	43.9			18.3	25.8	
Approach LOS	D			B	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	11.0	39.0				50.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	7.0	35.0				46.0
Max Q Clear Time (g_c+I1), s		7.5	8.4	37.0				17.4
Green Ext Time (p_c), s		0.3	0.0	0.0				13.6

Intersection Summary	
HCM 2010 Ctrl Delay	31.6
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Future Volume (veh/h)	0	626	6	82	582	108	5	0	31	77	8	49
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	680	7	89	633	0	5	0	34	90	0	53
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1244	13	217	1949	872	0	0	0	1158	0	517
Arrive On Green	0.00	0.33	0.33	0.12	0.53	0.00	0.00	0.00	0.00	0.31	0.00	0.31
Sat Flow, veh/h	0	3829	38	1845	3681	1647		0		3690	0	1647
Grp Volume(v), veh/h	0	335	352	89	633	0		0.0		90	0	53
Grp Sat Flow(s),veh/h/ln	0	1840	1930	1845	1840	1647				1845	0	1647
Q Serve(g_s), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Cycle Q Clear(g_c), s	0.0	7.6	7.6	2.3	5.0	0.0				0.9	0.0	1.2
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	613	643	217	1949	872				1158	0	517
V/C Ratio(X)	0.00	0.55	0.55	0.41	0.32	0.00				0.08	0.00	0.10
Avail Cap(c_a), veh/h	0	613	643	217	1949	872				1158	0	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.9	13.9	20.9	6.8	0.0				12.3	0.0	12.4
Incr Delay (d2), s/veh	0.0	3.5	3.3	5.6	0.4	0.0				0.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.4	4.6	1.5	2.6	0.0				0.5	0.0	0.6
LnGrp Delay(d),s/veh	0.0	17.3	17.2	26.5	7.3	0.0				12.4	0.0	12.8
LnGrp LOS		B	B	C	A					B		B
Approach Vol, veh/h		687			722						143	
Approach Delay, s/veh		17.3			9.6						12.6	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			10.0	21.0		20.0		31.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			6.0	17.0		16.0		27.0
Max Q Clear Time (g_c+I1), s			4.3	9.6		3.2		7.0
Green Ext Time (p_c), s			0.0	2.5		0.3		4.3

Intersection Summary	
HCM 2010 Ctrl Delay	13.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Future Volume (veh/h)	179	691	9	28	1014	299	9	2	15	292	7	73
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	195	751	10	30	1102	325	10	2	16	202	169	79
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	1209	16	115	1058	473	329	66	350	369	250	117
Arrive On Green	0.10	0.32	0.32	0.06	0.29	0.29	0.21	0.21	0.21	0.20	0.20	0.20
Sat Flow, veh/h	1845	3719	50	1845	3681	1647	1550	310	1647	1845	1250	584
Grp Volume(v), veh/h	195	372	389	30	1102	325	12	0	16	202	0	248
Grp Sat Flow(s),veh/h/ln	1845	1840	1929	1845	1840	1647	1860	0	1647	1845	0	1834
Q Serve(g_s), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Cycle Q Clear(g_c), s	8.0	13.7	13.7	1.2	23.0	14.0	0.4	0.0	0.6	7.9	0.0	10.0
Prop In Lane	1.00		0.03	1.00		1.00	0.83		1.00	1.00		0.32
Lane Grp Cap(c), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
V/C Ratio(X)	1.06	0.62	0.62	0.26	1.04	0.69	0.03	0.00	0.05	0.55	0.00	0.68
Avail Cap(c_a), veh/h	185	598	627	115	1058	473	395	0	350	369	0	367
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	22.8	22.8	35.7	28.5	25.3	25.0	0.0	25.0	28.7	0.0	29.6
Incr Delay (d2), s/veh	82.1	4.8	4.6	5.4	39.0	7.9	0.1	0.0	0.2	5.7	0.0	9.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.3	7.7	8.0	0.8	17.3	7.4	0.2	0.0	0.3	4.6	0.0	6.0
LnGrp Delay(d),s/veh	118.1	27.6	27.4	41.1	67.5	33.2	25.1	0.0	25.3	34.5	0.0	39.2
LnGrp LOS	F	C	C	D	F	C	C		C	C		D
Approach Vol, veh/h		956			1457			28			450	
Approach Delay, s/veh		46.0			59.3			25.2			37.1	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	30.0		20.0	12.0	27.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	26.0		16.0	8.0	23.0
Max Q Clear Time (g_c+I1), s		2.6	3.2	15.7		12.0	10.0	25.0
Green Ext Time (p_c), s		0.0	0.0	3.5		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	51.1
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Future Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	123	838	272	98	1080	483	394	413	351	394	413	351
Arrive On Green	0.07	0.31	0.31	0.05	0.29	0.29	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1845	2732	888	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	66	634	617	96	832	201	250	306	153	368	411	424
Grp Sat Flow(s),veh/h/ln	1845	1840	1780	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Cycle Q Clear(g_c), s	2.6	23.0	23.0	3.9	15.5	7.4	9.2	11.1	6.0	14.7	15.9	16.0
Prop In Lane	1.00		0.50	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
V/C Ratio(X)	0.54	1.12	1.13	0.98	0.77	0.42	0.64	0.74	0.44	0.93	0.99	1.21
Avail Cap(c_a), veh/h	123	564	546	98	1080	483	394	413	351	394	413	351
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.9	26.0	26.0	35.5	24.2	21.3	26.8	27.6	25.6	29.0	29.5	29.5
Incr Delay (d2), s/veh	15.8	76.4	79.7	84.3	5.3	2.6	7.6	11.3	3.9	31.6	42.9	116.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	23.6	23.3	4.3	8.7	3.7	5.6	7.2	3.1	10.9	13.4	18.6
LnGrp Delay(d),s/veh	49.6	102.4	105.7	119.7	29.5	24.0	34.5	38.9	29.5	60.6	72.4	146.4
LnGrp LOS	D	F	F	F	C	C	C	D	C	E	E	F
Approach Vol, veh/h		1317			1129			709			1203	
Approach Delay, s/veh		101.3			36.2			35.3			94.9	
Approach LOS		F			D			D			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	27.0		20.0	9.0	26.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	23.0		16.0	5.0	22.0
Max Q Clear Time (g_c+I1), s		13.1	5.9	25.0		18.0	4.6	17.5
Green Ext Time (p_c), s		1.0	0.0	0.0		0.0	0.0	2.5

Intersection Summary	
HCM 2010 Ctrl Delay	71.9
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Future Vol, veh/h	23	78	7	7	86	9	4	5	8	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	25	85	8	8	93	10	4	5	9	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	7.6	7.3
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	24%	21%	7%
Vol Thru, %	29%	72%	84%
Vol Right, %	47%	6%	9%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	17	108	102
LT Vol	4	23	7
Through Vol	5	78	86
RT Vol	8	7	9
Lane Flow Rate	18	117	111
Geometry Grp	1	1	1
Degree of Util (X)	0.021	0.132	0.124
Departure Headway (Hd)	4.088	4.052	4.014
Convergence, Y/N	Yes	Yes	Yes
Cap	860	884	891
Service Time	2.187	2.083	2.047
HCM Lane V/C Ratio	0.021	0.132	0.125
HCM Control Delay	7.3	7.7	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0.1	0.5	0.4

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Future Vol, veh/h	0	195	55	31	35	0	0	0	0	28	0	46
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	212	60	34	38	0	0	0	0	30	0	50

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	212	0	0			318	318	38
Stage 1	-	-	-	-	-	-			106	106	-
Stage 2	-	-	-	-	-	-			212	212	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1358	-	0			675	598	1034
Stage 1	0	-	-	-	-	0			918	807	-
Stage 2	0	-	-	-	-	0			823	727	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1358	-	-			657	0	1034
Mov Cap-2 Maneuver	-	-	-	-	-	-			657	0	-
Stage 1	-	-	-	-	-	-			894	0	-
Stage 2	-	-	-	-	-	-			823	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	3.6	9.5
HCM LOS			A

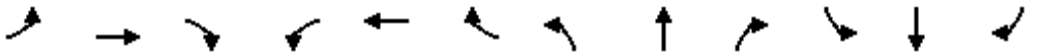
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1358	-	657	1034
HCM Lane V/C Ratio	-	-	0.025	-	0.046	0.048
HCM Control Delay (s)	-	-	7.7	0	10.7	8.7
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	945	137	935	1632	56	1428
Future Volume (veh/h)	945	137	935	1632	56	1428
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1027	0	1016	1774	61	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1302	583	1211	1401	397	624
Arrive On Green	0.35	0.00	0.34	0.72	0.22	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	1027	0	1016	1774	61	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	32.5	0.0	34.1	94.0	3.5	0.0
Cycle Q Clear(g_c), s	32.5	0.0	34.1	94.0	3.5	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1302	583	1211	1401	397	624
V/C Ratio(X)	0.79	0.00	0.84	1.27	0.15	0.00
Avail Cap(c_a), veh/h	1302	583	1211	1401	397	624
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	37.6	0.0	39.7	18.0	41.4	0.0
Incr Delay (d2), s/veh	4.9	0.0	7.0	125.7	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	17.4	0.0	18.0	98.3	1.9	0.0
LnGrp Delay(d),s/veh	42.5	0.0	46.8	143.7	42.2	0.0
LnGrp LOS	D		D	F	D	
Approach Vol, veh/h	1027			2790	61	
Approach Delay, s/veh	42.5			108.4	42.2	
Approach LOS	D			F	D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		32.0	48.0	50.0				98.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		28.0	44.0	46.0				94.0
Max Q Clear Time (g_c+I1), s		5.5	36.1	34.5				96.0
Green Ext Time (p_c), s		0.1	2.8	5.5				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	89.9
HCM 2010 LOS	F

Appendix M.1 – Analysis Output Sheets (Future with Project Alternative 3)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	81	61	94	301	569	169	18	141	83	23	70
Future Volume (vph)	90	81	61	94	301	569	169	18	141	83	23	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3143	1441		1782	1583		1793	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3143	1441		1782	1583		1793	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	88	66	102	327	618	184	20	153	90	25	76
RTOR Reduction (vph)	0	0	58	0	228	255	0	0	91	0	0	58
Lane Group Flow (vph)	98	88	8	102	408	54	0	204	62	0	115	18
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Effective Green, g (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Actuated g/C Ratio	0.07	0.11	0.11	0.11	0.17	0.17		0.29	0.29		0.23	0.23
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	132	212	180	199	546	250		518	460		419	369
v/s Ratio Prot	0.06	0.05		c0.06	c0.13			c0.11			c0.06	
v/s Ratio Perm			0.00			0.04			0.04			0.01
v/c Ratio	0.74	0.42	0.04	0.51	0.75	0.21		0.39	0.13		0.27	0.05
Uniform Delay, d1	33.4	30.3	29.0	30.7	28.9	26.1		20.9	19.3		23.1	21.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	20.0	0.5	0.0	2.2	4.9	0.2		2.2	0.6		1.6	0.2
Delay (s)	53.3	30.8	29.1	33.0	33.7	26.2		23.1	19.9		24.7	22.1
Level of Service	D	C	C	C	C	C		C	B		C	C
Approach Delay (s)		39.1			31.4			21.7			23.7	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	18.3
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	416	0	377	0	0	177	472	0	120	164	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	0	0	0	0	461	0	410	0	0	196	523	0	133	182	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929		4.6453	4.3276			4.3276		4.6453	4.3276	
Follow-Up Headway (s)		3.1858		2.6667	2.5352			2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		0		0	461	410		196	523	133	182	
Entry Volume veh/h		0		0	452	410		192	513	130	178	
Circulating Flow (v_c), pc/h	776			196			133			461		
Exiting Flow (v_{ex}), pc/h	133			0			196			643		
Capacity (c_{pce}), pc/h		520		1127	1202			1268		883	960	
Capacity (c), veh/h		510		1105	1179			1243		866	941	
v/c Ratio (x)		0.00		0.00	0.38			0.15		0.15	0.19	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.1		3.3	6.9	0.0		4.2	0.0	5.6	5.7	
Lane LOS		A		A	A	A		A	A	A	A	
95% Queue, veh		0.0		0.0	1.8			0.5		0.5	0.7	
Approach Delay, s/veh				3.6			1.1			5.7		
Approach LOS				A			A			A		
Intersection Delay, s/veh | LOS	3.0						A					

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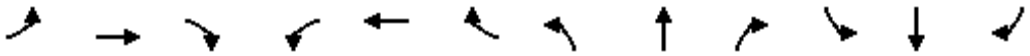
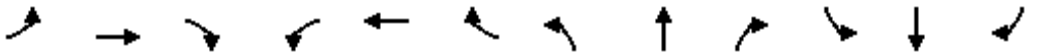


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	22	4	44	28	85	12	58	63	127	80	6
Future Volume (vph)	2	22	4	44	28	85	12	58	63	127	80	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	24	4	48	30	92	13	63	68	138	87	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	30	170	144	232
Volume Left (vph)	2	48	13	138
Volume Right (vph)	4	92	68	7
Hadj (s)	-0.03	-0.23	-0.23	0.13
Departure Headway (s)	5.0	4.6	4.4	4.7
Degree Utilization, x	0.04	0.22	0.18	0.30
Capacity (veh/h)	647	723	764	729
Control Delay (s)	8.2	8.9	8.4	9.7
Approach Delay (s)	8.2	8.9	8.4	9.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.1			
Level of Service	A			
Intersection Capacity Utilization	45.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	172	15	47	8	28	54	44	292	16	21	401	98
Future Volume (vph)	172	15	47	8	28	54	44	292	16	21	401	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1781	1583		1704		1770	1849		1770	1863	1583
Flt Permitted		0.72	1.00		0.97		0.45	1.00		0.54	1.00	1.00
Satd. Flow (perm)		1349	1583		1668		840	1849		1015	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	16	51	9	30	59	48	317	17	23	436	107
RTOR Reduction (vph)	0	0	37	0	43	0	0	2	0	0	0	41
Lane Group Flow (vph)	0	203	14	0	55	0	48	332	0	23	436	66
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		15.1	15.1		15.1		32.7	32.7		33.9	33.9	33.9
Effective Green, g (s)		15.1	15.1		15.1		32.7	32.7		33.9	33.9	33.9
Actuated g/C Ratio		0.27	0.27		0.27		0.59	0.59		0.62	0.62	0.62
Clearance Time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		7.0	7.0	7.0
Lane Grp Cap (vph)		370	434		457		499	1099		625	1148	975
v/s Ratio Prot								0.18			c0.23	
v/s Ratio Perm		c0.15	0.01		0.03		0.06			0.02		0.04
v/c Ratio		0.55	0.03		0.12		0.10	0.30		0.04	0.38	0.07
Uniform Delay, d1		17.0	14.6		15.0		4.8	5.5		4.1	5.3	4.2
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		4.6	0.1		0.4		0.4	0.7		0.1	1.0	0.1
Delay (s)		21.6	14.7		15.4		5.2	6.2		4.3	6.2	4.4
Level of Service		C	B		B		A	A		A	A	A
Approach Delay (s)		20.2			15.4			6.1			5.8	
Approach LOS		C			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Civic Center Drive
Agency or Co.	IBI Group	E/W Street Name	Civic Center Drive
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	11	7	7	0	15	10	13	0	6	292	18	0	38	347	11
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	12	8	8	0	17	11	14	0	7	324	20	0	42	385	12
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		28			42			351			439	
Entry Volume veh/h		27			41			344			430	
Circulating Flow (v_c), pc/h	444			343			62			35		
Exiting Flow (v_{ex}), pc/h	70			30			350			410		
Capacity (c_{pce}), pc/h		725			802			1062			1091	
Capacity (c), veh/h		711			786			1041			1070	
v/c Ratio (x)		0.04			0.05			0.33			0.40	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.5			5.1			6.8			7.6	
Lane LOS		A			A			A			A	
95% Queue, veh		0.1			0.2			1.5			2.0	
Approach Delay, s/veh	5.5			5.1			6.8			7.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.1						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Pier View Way
Agency or Co.	IBI Group	E/W Street Name	Pier View Way
Date Performed	7/11/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	16	12	23	0	2	18	3	0	18	329	2	0	2	358	47
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	18	13	26	0	2	20	3	0	20	365	2	0	2	397	52
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		57			25			387			451	
Entry Volume veh/h		56			25			379			442	
Circulating Flow (v_c), pc/h	401			403			33			42		
Exiting Flow (v_{ex}), pc/h	17			92			386			425		
Capacity (c_{pce}), pc/h		757			755			1093			1084	
Capacity (c), veh/h		742			740			1072			1062	
v/c Ratio (x)		0.08			0.03			0.35			0.42	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.6			5.2			7.0			7.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.1			1.6			2.1	
Approach Delay, s/veh	5.6			5.2			7.0			7.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.3						A					

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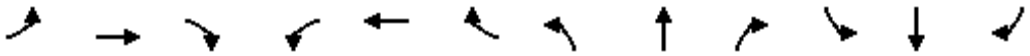


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	4	26	10	8	4	122	219	4	5	150	9
Future Volume (vph)	3	4	26	10	8	4	122	219	4	5	150	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	4	28	11	9	4	133	238	4	5	163	10

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	7	28	24	252	123	87	92
Volume Left (vph)	3	0	11	133	0	5	0
Volume Right (vph)	0	28	4	0	4	0	10
Hadj (s)	0.25	-0.67	0.03	0.30	0.01	0.06	-0.04
Departure Headway (s)	6.0	5.1	5.8	5.1	4.8	5.1	4.9
Degree Utilization, x	0.01	0.04	0.04	0.36	0.16	0.12	0.13
Capacity (veh/h)	548	640	573	692	729	689	706
Control Delay (s)	7.9	7.1	9.0	9.7	7.6	7.6	7.5
Approach Delay (s)	7.3		9.0	9.0		7.5	
Approach LOS	A		A	A		A	

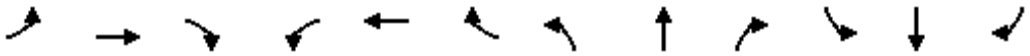
Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	32.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	128	57	128	90	34	113
Future Volume (vph)	128	57	128	90	34	113
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	139	62	139	98	37	123

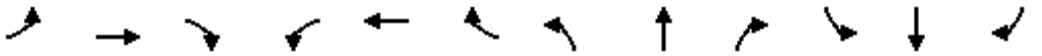
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	139	62	237	160
Volume Left (vph)	139	0	0	37
Volume Right (vph)	0	62	98	0
Hadj (s)	0.53	-0.67	-0.21	0.08
Departure Headway (s)	6.0	4.8	4.4	4.8
Degree Utilization, x	0.23	0.08	0.29	0.21
Capacity (veh/h)	568	706	776	708
Control Delay (s)	9.5	7.0	9.3	9.1
Approach Delay (s)	8.8		9.3	9.1
Approach LOS	A		A	A

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	37.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	0	126	34	166	31	0	0	0	0	29	39
Future Volume (vph)	17	0	126	34	166	31	0	0	0	0	29	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.98						0.91	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3455						3238	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3455						3238	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	0	137	37	180	34	0	0	0	0	32	42
RTOR Reduction (vph)	0	0	128	15	14	0	0	0	0	0	39	0
Lane Group Flow (vph)	18	0	9	22	200	0	0	0	0	0	35	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	3.3		3.3	29.3	29.3						3.9	
Effective Green, g (s)	3.3		3.3	29.3	29.3						3.9	
Actuated g/C Ratio	0.07		0.07	0.59	0.59						0.08	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	116		183	1037	2024						252	
v/s Ratio Prot	c0.01		0.00	0.01	c0.06						c0.01	
v/s Ratio Perm												
v/c Ratio	0.16		0.05	0.02	0.10						0.14	
Uniform Delay, d1	22.0		21.9	4.3	4.5						21.5	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.6		0.1	0.0	0.1						0.3	
Delay (s)	22.7		22.0	4.4	4.6						21.7	
Level of Service	C		C	A	A						C	
Approach Delay (s)		22.1			4.6			0.0			21.7	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	125	204	65	65	495	0	0	282	30
Future Volume (vph)	0	0	0	125	204	65	65	495	0	0	282	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1526	1770	1863			1767	1461
Flt Permitted				0.95	1.00	1.00	0.44	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1526	816	1863			1767	1461
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	136	222	71	71	538	0	0	307	33
RTOR Reduction (vph)	0	0	0	0	0	49	0	0	0	0	1	22
Lane Group Flow (vph)	0	0	0	136	222	22	71	538	0	0	309	8
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.1	18.1	18.1	30.6	30.6			15.5	15.5
Effective Green, g (s)				18.1	18.1	18.1	30.6	30.6			15.5	15.5
Actuated g/C Ratio				0.31	0.31	0.31	0.52	0.52			0.26	0.26
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				545	1091	470	589	971			466	385
v/s Ratio Prot				c0.08	0.06		0.02	c0.29			c0.18	
v/s Ratio Perm						0.01	0.04					0.01
v/c Ratio				0.25	0.20	0.05	0.12	0.55			0.66	0.02
Uniform Delay, d1				15.2	15.0	14.2	9.7	9.5			19.3	16.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				1.1	0.4	0.2	0.1	0.8			3.9	0.0
Delay (s)				16.3	15.4	14.4	9.9	10.3			23.2	16.0
Level of Service				B	B	B	A	B			C	B
Approach Delay (s)		0.0			15.5			10.3			22.5	
Approach LOS		A			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	58.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	51.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	116	1	131	434	214	11	25	198	144	50	6
Future Volume (vph)	24	116	1	131	434	214	11	25	198	144	50	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3535		1770	3539	1583		1835	1583	1681	1714	
Flt Permitted	0.44	1.00		0.67	1.00	1.00		0.94	1.00	0.73	0.89	
Satd. Flow (perm)	815	3535		1251	3539	1583		1752	1583	1295	1562	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	126	1	142	472	233	12	27	215	157	54	7
RTOR Reduction (vph)	0	1	0	0	0	169	0	0	96	0	3	0
Lane Group Flow (vph)	26	126	0	142	472	64	0	39	119	107	108	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	15.4	15.4		15.0	15.0	15.0		30.4	30.4	30.4	30.4	
Effective Green, g (s)	15.4	15.4		15.0	15.0	15.0		30.4	30.4	30.4	30.4	
Actuated g/C Ratio	0.28	0.28		0.27	0.27	0.27		0.55	0.55	0.55	0.55	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	228	989		341	965	431		968	874	715	863	
v/s Ratio Prot		0.04			c0.13							
v/s Ratio Perm	0.03			0.11		0.04		0.02	0.08	c0.08	0.07	
v/c Ratio	0.11	0.13		0.42	0.49	0.15		0.04	0.14	0.15	0.12	
Uniform Delay, d1	14.7	14.8		16.4	16.8	15.2		5.6	5.9	6.0	5.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.1		1.0	0.5	0.2		0.1	0.3	0.4	0.3	
Delay (s)	15.0	14.9		17.4	17.2	15.3		5.7	6.3	6.4	6.2	
Level of Service	B	B		B	B	B		A	A	A	A	
Approach Delay (s)		14.9			16.7			6.2			6.3	
Approach LOS		B			B			A			A	

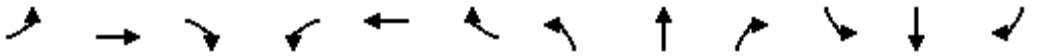
Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	78	5	19	28	5	8
Future Volume (Veh/h)	78	5	19	28	5	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	85	5	21	30	5	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			90		160	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			90		160	88
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	99
cM capacity (veh/h)			1505		820	971

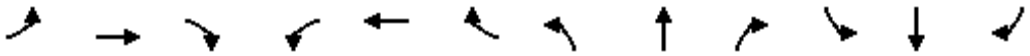
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	90	51	14
Volume Left	0	21	5
Volume Right	5	0	9
cSH	1700	1505	911
Volume to Capacity	0.05	0.01	0.02
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	3.1	9.0
Lane LOS		A	A
Approach Delay (s)	0.0	3.1	9.0
Approach LOS			A

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	19.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	51	86	0	0	0	24	220	61	71	213	47
Future Volume (vph)	80	51	86	0	0	0	24	220	61	71	213	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.95				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1498				1770	1863	1552	1770	1863	1518
Flt Permitted	0.95	1.00	1.00				0.61	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)	1770	1863	1498				1144	1863	1552	824	1863	1518
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	55	93	0	0	0	26	239	66	77	232	51
RTOR Reduction (vph)	0	0	52	0	0	0	0	0	47	0	0	31
Lane Group Flow (vph)	87	55	41	0	0	0	26	239	19	77	232	20
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	24.1	24.1	24.1				15.7	15.7	15.7	22.1	22.1	22.1
Effective Green, g (s)	24.1	24.1	24.1				15.7	15.7	15.7	22.1	22.1	22.1
Actuated g/C Ratio	0.44	0.44	0.44				0.29	0.29	0.29	0.40	0.40	0.40
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	775	816	656				326	531	443	372	748	609
v/s Ratio Prot	c0.05	0.03						c0.13		0.01	c0.12	
v/s Ratio Perm			0.03				0.02		0.01	0.07		0.01
v/c Ratio	0.11	0.07	0.06				0.08	0.45	0.04	0.21	0.31	0.03
Uniform Delay, d1	9.1	8.9	8.9				14.4	16.1	14.2	10.6	11.2	10.0
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	0.2				0.5	2.7	0.2	0.3	1.1	0.1
Delay (s)	9.4	9.1	9.1				14.8	18.9	14.4	10.9	12.3	10.1
Level of Service	A	A	A				B	B	B	B	B	B
Approach Delay (s)		9.2			0.0			17.7			11.7	
Approach LOS		A			A			B			B	

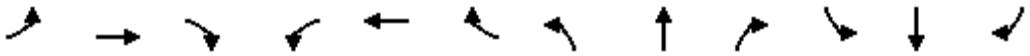
Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	199	10	0	0	0	0	4	17	18	7	0
Future Volume (Veh/h)	9	199	10	0	0	0	0	4	17	18	7	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	216	11	0	0	0	0	4	18	20	8	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			227			246	242	114	148	247	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			227			246	242	114	148	247	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	98	97	99	100
cM capacity (veh/h)	1622			1339			678	655	918	783	650	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	118	119	22	28
Volume Left	10	0	0	20
Volume Right	0	11	18	0
cSH	1622	1700	855	740
Volume to Capacity	0.01	0.07	0.03	0.04
Queue Length 95th (ft)	0	0	2	3
Control Delay (s)	0.7	0.0	9.3	10.1
Lane LOS	A		A	B
Approach Delay (s)	0.3		9.3	10.1
Approach LOS			A	B

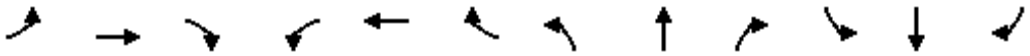
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	20.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	23	462	5	0	0	0	0	4	21	14	12	0
Future Volume (vph)	23	462	5	0	0	0	0	4	21	14	12	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	502	5	0	0	0	0	4	23	15	13	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	276	256	27	28
Volume Left (vph)	25	0	0	15
Volume Right (vph)	0	5	23	0
Hadj (s)	0.08	0.02	-0.48	0.14
Departure Headway (s)	4.7	4.7	4.6	5.2
Degree Utilization, x	0.36	0.33	0.03	0.04
Capacity (veh/h)	755	761	733	646
Control Delay (s)	9.2	8.8	7.7	8.4
Approach Delay (s)	9.0		7.7	8.4
Approach LOS	A		A	A

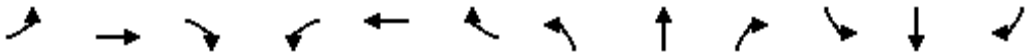
Intersection Summary				
Delay	8.9			
Level of Service	A			
Intersection Capacity Utilization	28.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	97	187	8	36	0	97	0	44	27	0	0	0
Future Volume (vph)	97	187	8	36	0	97	0	44	27	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	105	203	9	39	0	105	0	48	29	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	105	212	144	77
Volume Left (vph)	105	0	39	0
Volume Right (vph)	0	9	105	29
Hadj (s)	0.53	0.00	-0.35	-0.19
Departure Headway (s)	5.3	4.8	4.2	4.7
Degree Utilization, x	0.16	0.28	0.17	0.10
Capacity (veh/h)	663	733	829	705
Control Delay (s)	8.1	8.5	8.0	8.2
Approach Delay (s)	8.4		8.0	8.2
Approach LOS	A		A	A

Intersection Summary				
Delay	8.3			
Level of Service	A			
Intersection Capacity Utilization	32.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	15	0	0	32	15	219	21	15	226	7
Future Volume (Veh/h)	0	0	15	0	0	32	15	219	21	15	226	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	16	0	0	35	16	238	23	16	246	8
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked												
vC, conflicting volume	594	589	257	582	582	256	261			268		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	594	589	257	582	582	256	261			268		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	95	99			99		
cM capacity (veh/h)	384	405	777	400	409	776	1296			1286		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	16	35	16	261	16	254
Volume Left	0	0	16	0	16	0
Volume Right	16	35	0	23	0	8
cSH	777	776	1296	1700	1286	1700
Volume to Capacity	0.02	0.05	0.01	0.15	0.01	0.15
Queue Length 95th (ft)	2	4	1	0	1	0
Control Delay (s)	9.7	9.9	7.8	0.0	7.8	0.0
Lane LOS	A	A	A		A	
Approach Delay (s)	9.7	9.9	0.5		0.5	
Approach LOS	A	A				

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	23.0%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	13	2	22	0	39	6	4	0	16	214	11	0	3	224	16
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	14	2	24	0	43	7	4	0	18	237	12	0	3	248	18
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		40			54			267			269	
Entry Volume veh/h		39			53			262			264	
Circulating Flow (v_c), pc/h	294			269			19			68		
Exiting Flow (v_{ex}), pc/h	17			43			255			315		
Capacity (c_{pce}), pc/h		842			863			1109			1056	
Capacity (c), veh/h		826			847			1087			1035	
v/c Ratio (x)		0.05			0.06			0.24			0.25	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.8			4.8			5.6			5.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.1			0.2			0.9			1.0	
Approach Delay, s/veh	4.8			4.8			5.6			5.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.6						A					

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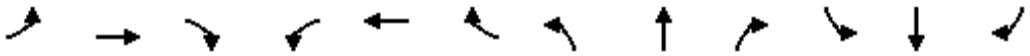
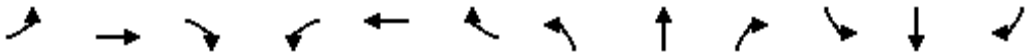


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	29	17	25	3	77	3	140	39	90	96	1
Future Volume (vph)	20	29	17	25	3	77	3	140	39	90	96	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	32	18	27	3	84	3	152	42	98	104	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	72	114	197	203
Volume Left (vph)	22	27	3	98
Volume Right (vph)	18	84	42	1
Hadj (s)	-0.05	-0.36	-0.09	0.13
Departure Headway (s)	4.9	4.6	4.5	4.7
Degree Utilization, x	0.10	0.15	0.25	0.27
Capacity (veh/h)	657	711	757	723
Control Delay (s)	8.5	8.4	9.0	9.4
Approach Delay (s)	8.5	8.4	9.0	9.4
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	37.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	195	18	3	90	15	9	20	23	21	28	11
Future Volume (Veh/h)	8	195	18	3	90	15	9	20	23	21	28	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	212	20	3	98	16	10	22	25	23	30	12
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	128			239			387	381	229	402	383	121
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	128			239			387	381	229	402	383	121
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			98	96	97	95	94	99
cM capacity (veh/h)	1441			1320			526	537	806	508	536	919

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	241	117	57	65
Volume Left	9	3	10	23
Volume Right	20	16	25	12
cSH	1441	1320	627	569
Volume to Capacity	0.01	0.00	0.09	0.11
Queue Length 95th (ft)	0	0	7	10
Control Delay (s)	0.3	0.2	11.3	12.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.2	11.3	12.1
Approach LOS			B	B

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	28.1%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	52	59	133	0	98	32	30	0	65	213	70	0	18	235	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	58	65	147	0	109	35	33	0	72	236	78	0	20	261	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		270			177			386			300	
Entry Volume veh/h		265			174			378			294	
Circulating Flow (v_c), pc/h		390			366			143			216	
Exiting Flow (v_{ex}), pc/h		163			126			327			517	
Capacity (c_{pce}), pc/h		765			784			979			910	
Capacity (c), veh/h		750			768			960			893	
v/c Ratio (x)		0.35			0.23			0.39			0.33	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.2			7.2			8.1			7.6	
Lane LOS		A			A			A			A	
95% Queue, veh		1.6			0.9			1.9			1.4	
Approach Delay, s/veh	9.2			7.2			8.1			7.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.1						A					

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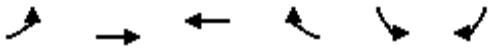
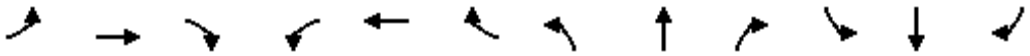


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	242	234	5	16	14
Future Volume (Veh/h)	8	242	234	5	16	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	263	254	5	17	15
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	267				546	266
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	267				546	266
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	98
cM capacity (veh/h)	1288				491	767

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	272	259	32
Volume Left	9	0	17
Volume Right	0	5	15
cSH	1288	1700	591
Volume to Capacity	0.01	0.15	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.3	0.0	11.4
Lane LOS	A		B
Approach Delay (s)	0.3	0.0	11.4
Approach LOS			B

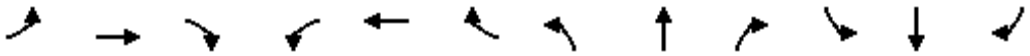
Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	228	10	21	215	13	6	5	14	40	1	6
Future Volume (Veh/h)	8	228	10	21	215	13	6	5	14	40	1	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	248	11	23	234	14	7	5	15	43	1	7
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	250			259			568	568	254	578	566	245
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	250			259			568	568	254	578	566	245
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			98	99	98	89	100	99
cM capacity (veh/h)	1313			1306			420	421	785	406	422	791

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	268	271	27	51
Volume Left	9	23	7	43
Volume Right	11	14	15	7
cSH	1313	1306	567	436
Volume to Capacity	0.01	0.02	0.05	0.12
Queue Length 95th (ft)	1	1	4	10
Control Delay (s)	0.3	0.8	11.7	14.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	11.7	14.4
Approach LOS			B	B

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	36.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	118	202	73	150	0	109	0	37	0	0	0
Future Volume (vph)	0	118	202	73	150	0	109	0	37	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	128	220	79	163	0	118	0	40	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	348	242	158	0
Volume Left (vph)	0	79	118	0
Volume Right (vph)	220	0	40	0
Hadj (s)	-0.35	0.10	0.03	0.00
Departure Headway (s)	4.3	4.8	5.3	5.5
Degree Utilization, x	0.42	0.32	0.23	0.00
Capacity (veh/h)	808	711	614	564
Control Delay (s)	10.3	10.1	9.8	8.5
Approach Delay (s)	10.3	10.1	9.8	0.0
Approach LOS	B	B	A	A

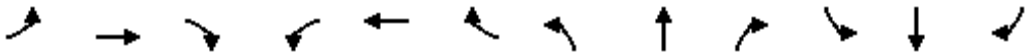
Intersection Summary				
Delay	10.2			
Level of Service	B			
Intersection Capacity Utilization	53.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	49	69	88	31	81	105
Future Volume (vph)	49	69	88	31	81	105
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	75	96	34	88	114

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	128	130	202
Volume Left (vph)	53	0	88
Volume Right (vph)	75	34	0
Hadj (s)	-0.23	-0.12	0.12
Departure Headway (s)	4.4	4.3	4.5
Degree Utilization, x	0.16	0.16	0.25
Capacity (veh/h)	755	799	774
Control Delay (s)	8.2	8.1	9.0
Approach Delay (s)	8.2	8.1	9.0
Approach LOS	A	A	A

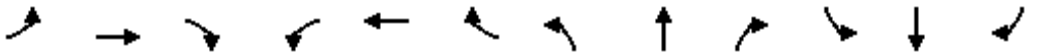
Intersection Summary			
Delay	8.5		
Level of Service	A		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	240	1	6	193	37	7	10	11	37	15	9
Future Volume (Veh/h)	7	240	1	6	193	37	7	10	11	37	15	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	261	1	7	210	40	8	11	12	40	16	10
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.93						0.93	0.93		0.93	0.93	0.93
vC, conflicting volume	253			273			554	556	280	550	536	237
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	160			273			484	485	280	480	464	143
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	97	98	91	96	99
cM capacity (veh/h)	1317			1278			428	438	746	434	450	837

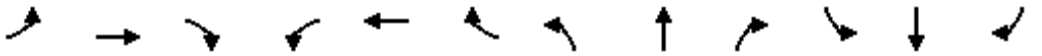
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	270	257	31	66
Volume Left	8	7	8	40
Volume Right	1	40	12	10
cSH	1317	1278	518	473
Volume to Capacity	0.01	0.01	0.06	0.14
Queue Length 95th (ft)	0	0	5	12
Control Delay (s)	0.3	0.3	12.4	13.8
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	12.4	13.8
Approach LOS			B	B

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	30.7%	ICU Level of Service	A
Analysis Period (min)	15		



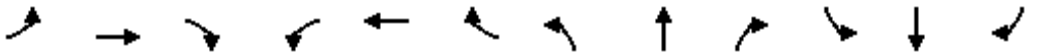
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	128	72	88	129	75	37	154	47	82	195	14
Future Volume (vph)	20	128	72	88	129	75	37	154	47	82	195	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	10	11	11	16	16	16
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1850	1534	1681	1764	1794	1652	3287		2006	2090	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1850	1534	1681	1764	1794	1652	3287		2006	2090	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	139	78	96	140	82	40	167	51	89	212	15
RTOR Reduction (vph)	0	0	67	0	0	69	0	32	0	0	2	0
Lane Group Flow (vph)	0	161	11	86	150	13	40	186	0	89	225	0
Confl. Peds. (#/hr)			10	10					3			
Confl. Bikes (#/hr)			4						3			
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		11.3	11.3	12.5	12.5	12.5	4.3	28.5		8.9	33.1	
Effective Green, g (s)		11.3	11.3	12.5	12.5	12.5	4.3	28.5		8.9	33.1	
Actuated g/C Ratio		0.14	0.14	0.16	0.16	0.16	0.05	0.36		0.11	0.41	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		261	216	262	275	280	88	1170		223	864	
v/s Ratio Prot		c0.09		0.05	c0.09		0.02	0.06		c0.04	c0.11	
v/s Ratio Perm			0.01			0.01						
v/c Ratio		0.62	0.05	0.33	0.55	0.05	0.45	0.16		0.40	0.26	
Uniform Delay, d1		32.3	29.7	30.0	31.1	28.7	36.7	17.6		33.1	15.4	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.0	0.0	0.9	2.5	0.1	1.4	0.3		1.2	0.7	
Delay (s)		35.3	29.7	30.9	33.6	28.8	38.1	17.9		34.2	16.1	
Level of Service		D	C	C	C	C	D	B		C	B	
Approach Delay (s)		33.5			31.6			21.0			21.2	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



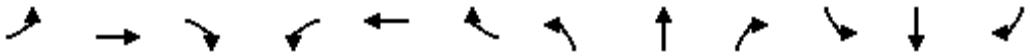
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	336	0	17	433	105	8	10	37	322	16	58
Future Volume (vph)	14	336	0	17	433	105	8	10	37	322	16	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3539		1756	3425			3128			1777	1527
Flt Permitted	0.31	1.00		0.52	1.00			0.91			0.69	1.00
Satd. Flow (perm)	579	3539		960	3425			2879			1284	1527
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	365	0	18	471	114	9	11	40	350	17	63
RTOR Reduction (vph)	0	0	0	0	49	0	0	17	0	0	0	27
Lane Group Flow (vph)	15	365	0	18	536	0	0	43	0	0	367	36
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	14.1	14.1		14.1	14.1			31.4			31.4	31.4
Effective Green, g (s)	14.1	14.1		14.1	14.1			31.4			31.4	31.4
Actuated g/C Ratio	0.26	0.26		0.26	0.26			0.57			0.57	0.57
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	148	907		246	878			1643			733	871
v/s Ratio Prot		0.10			c0.16							
v/s Ratio Perm	0.03			0.02				0.01			c0.29	0.02
v/c Ratio	0.10	0.40		0.07	0.61			0.03			0.50	0.04
Uniform Delay, d1	15.6	17.0		15.5	18.0			5.1			7.1	5.2
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.3	0.3		0.1	1.3			0.0			2.4	0.1
Delay (s)	15.9	17.3		15.6	19.3			5.2			9.5	5.3
Level of Service	B	B		B	B			A			A	A
Approach Delay (s)		17.2			19.2			5.2			8.9	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	15	16	37	9	141	2	230	74	117	310	16
Future Volume (vph)	24	15	16	37	9	141	2	230	74	117	310	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	10	11	16
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected		0.98			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1744			1788	1794	1770	3842		1652	3397	
Flt Permitted		0.83			0.73	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1487			1356	1794	1770	3842		1652	3397	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	16	17	40	10	153	2	250	80	127	337	17
RTOR Reduction (vph)	0	15	0	0	0	131	0	48	0	0	5	0
Lane Group Flow (vph)	0	44	0	0	50	22	2	282	0	127	349	0
Confl. Peds. (#/hr)			4	4					3			
Confl. Bikes (#/hr)			1						2			
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		5.3			5.3	5.3	0.7	14.4		3.9	17.6	
Effective Green, g (s)		5.3			5.3	5.3	0.7	14.4		3.9	17.6	
Actuated g/C Ratio		0.14			0.14	0.14	0.02	0.39		0.10	0.47	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		211			192	254	33	1483		172	1602	
v/s Ratio Prot							0.00	0.07		c0.08	c0.10	
v/s Ratio Perm		0.03			c0.04	0.01						
v/c Ratio		0.21			0.26	0.09	0.06	0.19		0.74	0.22	
Uniform Delay, d1		14.1			14.3	13.9	18.0	7.6		16.2	5.8	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.3	0.1	0.8	0.1		15.2	0.1	
Delay (s)		14.3			14.5	13.9	18.7	7.6		31.4	5.9	
Level of Service		B			B	B	B	A		C	A	
Approach Delay (s)		14.3			14.1			7.7			12.6	
Approach LOS		B			B			A			B	

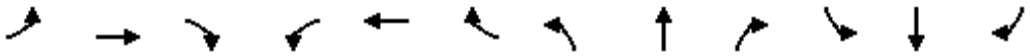
Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	37.3	Sum of lost time (s)	13.7
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	169	45	70	146	0	39	0	57	0	0	0
Future Volume (Veh/h)	0	169	45	70	146	0	39	0	57	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	184	49	76	159	0	42	0	62	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	159			233			520	520	208	582	544	159
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	159			233			520	520	208	582	544	159
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			94			91	100	93	100	100	100
cM capacity (veh/h)	1420			1335			447	435	832	376	421	886

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	233	235	104	0
Volume Left	0	76	42	0
Volume Right	49	0	62	0
cSH	1420	1335	617	1700
Volume to Capacity	0.00	0.06	0.17	0.00
Queue Length 95th (ft)	0	5	15	0
Control Delay (s)	0.0	2.9	12.0	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	2.9	12.0	0.0
Approach LOS			B	A

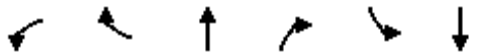
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	38.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	77	12	3	55	2	20	0	9	2	0	2
Future Volume (Veh/h)	2	77	12	3	55	2	20	0	9	2	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	84	13	3	60	2	22	0	10	2	0	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	62			97			164	162	90	172	168	61
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	62			97			164	162	90	172	168	61
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	100	99	100	100	100
cM capacity (veh/h)	1541			1496			798	727	967	782	722	1004

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	99	65	32	4
Volume Left	2	3	22	2
Volume Right	13	2	10	2
cSH	1541	1496	844	879
Volume to Capacity	0.00	0.00	0.04	0.00
Queue Length 95th (ft)	0	0	3	0
Control Delay (s)	0.2	0.4	9.4	9.1
Lane LOS	A	A	A	A
Approach Delay (s)	0.2	0.4	9.4	9.1
Approach LOS			A	A

Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	15.4%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	29	90	12	29	111	12
Future Volume (vph)	29	90	12	29	111	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	98	13	32	121	13

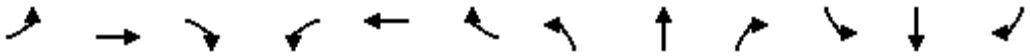
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	130	45	134
Volume Left (vph)	32	0	121
Volume Right (vph)	98	32	0
Hadj (s)	-0.37	-0.39	0.21
Departure Headway (s)	3.9	3.9	4.4
Degree Utilization, x	0.14	0.05	0.16
Capacity (veh/h)	875	873	787
Control Delay (s)	7.6	7.1	8.3
Approach Delay (s)	7.6	7.1	8.3
Approach LOS	A	A	A

Intersection Summary			
Delay	7.8		
Level of Service	A		
Intersection Capacity Utilization	27.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	81	115	18	54	4	87	13	18	19	15	7
Future Volume (Veh/h)	4	81	115	18	54	4	87	13	18	19	15	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	88	125	20	59	4	95	14	20	21	16	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	63			213			276	262	150	286	322	61
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	63			213			276	262	150	286	322	61
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			85	98	98	97	97	99
cM capacity (veh/h)	1540			1357			649	632	896	631	585	1004

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	217	83	129	45
Volume Left	4	20	95	21
Volume Right	125	4	20	8
cSH	1540	1357	676	656
Volume to Capacity	0.00	0.01	0.19	0.07
Queue Length 95th (ft)	0	1	18	6
Control Delay (s)	0.2	1.9	11.6	10.9
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	1.9	11.6	10.9
Approach LOS			B	B

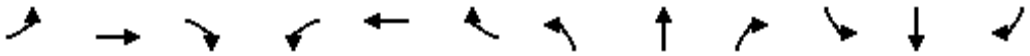
Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	30.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	64	17	12	40	5	5	5	34	2	6	2
Future Volume (Veh/h)	0	64	17	12	40	5	5	5	34	2	6	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	70	18	13	43	5	5	5	37	2	7	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	48			88			156	153	79	190	160	46
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	48			88			156	153	79	190	160	46
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	99	96	100	99	100
cM capacity (veh/h)	1559			1508			798	732	981	732	726	1024

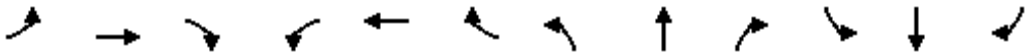
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	88	61	47	11
Volume Left	0	13	5	2
Volume Right	18	5	37	2
cSH	1559	1508	925	768
Volume to Capacity	0.00	0.01	0.05	0.01
Queue Length 95th (ft)	0	1	4	1
Control Delay (s)	0.0	1.6	9.1	9.8
Lane LOS		A	A	A
Approach Delay (s)	0.0	1.6	9.1	9.8
Approach LOS			A	A

Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	19.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	46	25	53	22	13	32	156	25	31	171	6
Future Volume (vph)	42	46	25	53	22	13	32	156	25	31	171	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.98		1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1774			1773		1770	3466		1770	3520	
Flt Permitted		0.84			0.79		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1512			1451		1770	3466		1770	3520	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	50	27	58	24	14	35	170	27	34	186	7
RTOR Reduction (vph)	0	17	0	0	10	0	0	15	0	0	3	0
Lane Group Flow (vph)	0	106	0	0	86	0	35	182	0	34	190	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		5.0			4.6		0.9	15.3		0.7	14.9	
Effective Green, g (s)		5.0			4.6		0.9	15.3		0.7	14.9	
Actuated g/C Ratio		0.14			0.13		0.03	0.44		0.02	0.43	
Clearance Time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		218			192		46	1532		35	1515	
v/s Ratio Prot							c0.02	0.05		c0.02	c0.05	
v/s Ratio Perm		c0.07			0.06							
v/c Ratio		0.49			0.45		0.76	0.12		0.97	0.13	
Uniform Delay, d1		13.6			13.8		16.7	5.7		16.9	5.9	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.7			1.9		48.2	0.0		140.0	0.0	
Delay (s)		15.3			15.8		64.9	5.7		156.9	6.0	
Level of Service		B			B		E	A		F	A	
Approach Delay (s)		15.3			15.8			14.6			28.6	
Approach LOS		B			B			B			C	

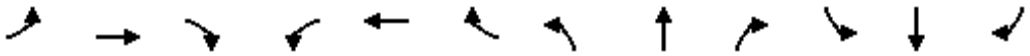
Intersection Summary			
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	34.6	Sum of lost time (s)	14.2
Intersection Capacity Utilization	31.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	33	107	29	34	61	28	12	40	29	22	33	39
Future Volume (Veh/h)	33	107	29	34	61	28	12	40	29	22	33	39
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	36	116	32	37	66	30	13	43	32	24	36	42
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	96			148			419	374	132	412	375	81
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	96			148			419	374	132	412	375	81
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			97			97	92	97	95	93	96
cM capacity (veh/h)	1498			1434			476	529	917	479	529	979

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	184	133	88	102
Volume Left	36	37	13	24
Volume Right	32	30	32	42
cSH	1498	1434	613	633
Volume to Capacity	0.02	0.03	0.14	0.16
Queue Length 95th (ft)	2	2	12	14
Control Delay (s)	1.6	2.3	11.8	11.8
Lane LOS	A	A	B	B
Approach Delay (s)	1.6	2.3	11.8	11.8
Approach LOS			B	B

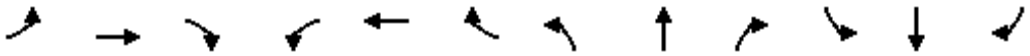
Intersection Summary				
Average Delay	5.6			
Intersection Capacity Utilization	26.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	70	18	11	43	1	14	18	25	5	9	3
Future Volume (vph)	2	70	18	11	43	1	14	18	25	5	9	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	76	20	12	47	1	15	20	27	5	10	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	98	60	62	18
Volume Left (vph)	2	12	15	5
Volume Right (vph)	20	1	27	3
Hadj (s)	-0.08	0.06	-0.18	-0.01
Departure Headway (s)	4.0	4.2	4.1	4.3
Degree Utilization, x	0.11	0.07	0.07	0.02
Capacity (veh/h)	865	828	840	801
Control Delay (s)	7.5	7.6	7.4	7.4
Approach Delay (s)	7.5	7.6	7.4	7.4
Approach LOS	A	A	A	A

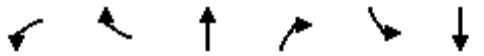
Intersection Summary				
Delay	7.5			
Level of Service	A			
Intersection Capacity Utilization	19.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	6	99	3	22	45	18	3	49	90	140	9	6
Future Volume (vph)	6	99	3	22	45	18	3	49	90	140	9	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	108	3	24	49	20	3	53	98	152	10	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	118	93	154	169
Volume Left (vph)	7	24	3	152
Volume Right (vph)	3	20	98	7
Hadj (s)	0.03	-0.04	-0.34	0.19
Departure Headway (s)	4.8	4.8	4.3	4.8
Degree Utilization, x	0.16	0.12	0.18	0.23
Capacity (veh/h)	690	693	788	709
Control Delay (s)	8.7	8.5	8.3	9.2
Approach Delay (s)	8.7	8.5	8.3	9.2
Approach LOS	A	A	A	A

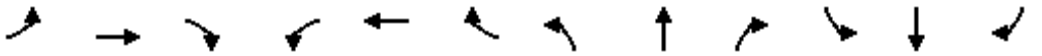
Intersection Summary				
Delay	8.7			
Level of Service	A			
Intersection Capacity Utilization	38.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	72	36	16	86	72
Future Volume (vph)	0	72	36	16	86	72
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	78	39	17	93	78

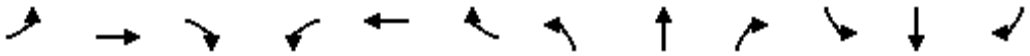
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	78	56	171
Volume Left (vph)	0	0	93
Volume Right (vph)	78	17	0
Hadj (s)	-0.57	-0.15	0.14
Departure Headway (s)	3.8	4.1	4.3
Degree Utilization, x	0.08	0.06	0.20
Capacity (veh/h)	885	848	827
Control Delay (s)	7.2	7.4	8.3
Approach Delay (s)	7.2	7.4	8.3
Approach LOS	A	A	A

Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	18.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	130	43	244	53	205	31	215	116	174	303	7
Future Volume (vph)	17	130	43	244	53	205	31	215	116	174	303	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.95		1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1555		1789	1794	1770	3753		2006	3997	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1555		1789	1794	1770	3753		2006	3997	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	141	47	265	58	223	34	234	126	189	329	8
RTOR Reduction (vph)	0	0	42	0	0	149	0	85	0	0	2	0
Lane Group Flow (vph)	18	141	5	0	323	74	34	275	0	189	335	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	7.0	7.0	7.0		16.3	23.0	1.3	20.6		6.7	26.0	
Effective Green, g (s)	7.0	7.0	7.0		16.3	23.0	1.3	20.6		6.7	26.0	
Actuated g/C Ratio	0.10	0.10	0.10		0.23	0.33	0.02	0.30		0.10	0.37	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	201	187	156		418	591	33	1109		192	1490	
v/s Ratio Prot	0.01	c0.08			c0.18	0.04	0.02	0.07		c0.09	c0.08	
v/s Ratio Perm			0.00									
v/c Ratio	0.09	0.75	0.03		0.77	0.12	1.03	0.25		0.98	0.22	
Uniform Delay, d1	28.5	30.5	28.3		25.0	16.3	34.2	18.7		31.4	15.0	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	14.1	0.0		8.6	0.1	166.0	0.5		60.0	0.4	
Delay (s)	28.5	44.6	28.3		33.6	16.4	200.2	19.2		91.4	15.3	
Level of Service	C	D	C		C	B	F	B		F	B	
Approach Delay (s)		39.5			26.6			34.8			42.7	
Approach LOS		D			C			C			D	

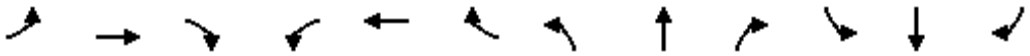
Intersection Summary			
HCM 2000 Control Delay	35.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	69.7	Sum of lost time (s)	19.1
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	349	5	16	520	52	0	0	27	29	0	31
Future Volume (Veh/h)	9	349	5	16	520	52	0	0	27	29	0	31
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	379	5	17	565	57	0	0	29	32	0	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	622			384			1063	1058	382	1058	1032	594
vC1, stage 1 conf vol							402	402		628	628	
vC2, stage 2 conf vol							662	656		430	404	
vCu, unblocked vol	622			322			1039	1033	320	1034	1006	594
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	96	92	100	93
cM capacity (veh/h)	959			1173			364	393	683	389	405	505

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	394	639	29	66
Volume Left	10	17	0	32
Volume Right	5	57	29	34
cSH	959	1173	683	442
Volume to Capacity	0.01	0.01	0.04	0.15
Queue Length 95th (ft)	1	1	3	13
Control Delay (s)	0.3	0.4	10.5	14.6
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.4	10.5	14.6
Approach LOS			B	B

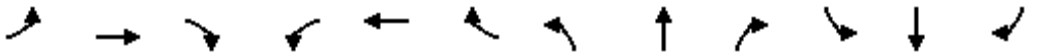
Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	54.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	421	10	31	663	29	10	4	66	35	4	18
Future Volume (Veh/h)	12	421	10	31	663	29	10	4	66	35	4	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	458	11	34	721	32	11	4	72	38	4	20
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked												
vC, conflicting volume	753			470			1302	1312	464	1363	1301	738
vC1, stage 1 conf vol							490	490		805	805	
vC2, stage 2 conf vol							812	821		558	496	
vCu, unblocked vol	753			470			1302	1312	464	1363	1301	738
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			97			96	99	88	87	99	95
cM capacity (veh/h)	857			1091			293	321	597	284	327	418

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	13	469	34	753	87	62
Volume Left	13	0	34	0	11	38
Volume Right	0	11	0	32	72	20
cSH	857	1700	1091	1700	510	320
Volume to Capacity	0.02	0.28	0.03	0.44	0.17	0.19
Queue Length 95th (ft)	1	0	2	0	15	18
Control Delay (s)	9.3	0.0	8.4	0.0	13.5	18.9
Lane LOS	A		A		B	C
Approach Delay (s)	0.2		0.4		13.5	18.9
Approach LOS					B	C

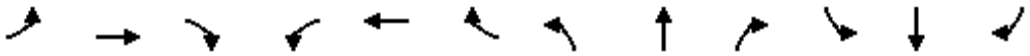
Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	53.2%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	25	602	0	0	776	119	0	0	0	0	0	20
Future Volume (Veh/h)	25	602	0	0	776	119	0	0	0	0	0	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	654	0	0	843	129	0	0	0	0	0	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	972			654			1573	1680	654	1616	1616	908
vC1, stage 1 conf vol							708	708		908	908	
vC2, stage 2 conf vol							865	972		708	708	
vCu, unblocked vol	972			654			1573	1680	654	1616	1616	908
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	100	100	93
cM capacity (veh/h)	709			933			247	255	467	262	281	334

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	27	654	0	972	0	22
Volume Left	27	0	0	0	0	0
Volume Right	0	0	0	129	0	22
cSH	709	1700	1700	1700	1700	334
Volume to Capacity	0.04	0.38	0.00	0.57	0.00	0.07
Queue Length 95th (ft)	3	0	0	0	0	5
Control Delay (s)	10.3	0.0	0.0	0.0	0.0	16.5
Lane LOS	B				A	C
Approach Delay (s)	0.4		0.0		0.0	16.5
Approach LOS					A	C

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	58.1%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	81	0	0	56	34	258	22	39	584	12
Future Volume (Veh/h)	0	0	81	0	0	56	34	258	22	39	584	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	88	0	0	61	37	280	24	42	635	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1000	1104	642	1173	1098	152	648			304		
vC1, stage 1 conf vol	726	726		366	366							
vC2, stage 2 conf vol	275	378		807	732							
vCu, unblocked vol	1000	1104	642	1173	1098	152	648			304		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	79	100	100	93	96			97		
cM capacity (veh/h)	336	363	417	213	344	867	934			1254		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	88	61	37	187	117	42	648
Volume Left	0	0	37	0	0	42	0
Volume Right	88	61	0	0	24	0	13
cSH	417	867	934	1700	1700	1254	1700
Volume to Capacity	0.21	0.07	0.04	0.11	0.07	0.03	0.38
Queue Length 95th (ft)	20	6	3	0	0	3	0
Control Delay (s)	15.9	9.5	9.0	0.0	0.0	8.0	0.0
Lane LOS	C	A	A			A	
Approach Delay (s)	15.9	9.5	1.0			0.5	
Approach LOS	C	A					

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	43.1%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Michigan Avenue
Agency or Co.	IBI Group	E/W Street Name	Michigan Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	89	14	38	0	47	15	8	0	23	238	6	0	6	234	28
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	99	16	42	0	52	17	9	0	26	264	7	0	7	259	31
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		157			78			297			297	
Entry Volume veh/h		154			76			291			291	
Circulating Flow (v_c), pc/h	318			389			122			95		
Exiting Flow (v_{ex}), pc/h	30			74			372			353		
Capacity (c_{pce}), pc/h		822			766			1000			1028	
Capacity (c), veh/h		806			751			981			1007	
v/c Ratio (x)		0.19			0.10			0.30			0.29	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.5			5.8			6.7			6.5	
Lane LOS		A			A			A			A	
95% Queue, veh		0.7			0.3			1.2			1.2	
Approach Delay, s/veh	6.5			5.8			6.7			6.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.5						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - West
Agency or Co.	IBI Group	E/W Street Name	West Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	17	10	8	0	14	10	31	0	8	93	14	0	31	93	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	19	11	9	0	16	11	34	0	9	103	16	0	34	103	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		39			61			128			156	
Entry Volume veh/h		38			60			125			153	
Circulating Flow (v_c), pc/h	153			131			64			36		
Exiting Flow (v_{ex}), pc/h	61			39			156			128		
Capacity (c_{pce}), pc/h		970			991			1060			1090	
Capacity (c), veh/h		951			972			1039			1069	
v/c Ratio (x)		0.04			0.06			0.12			0.14	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.1			4.3			4.5			4.6	
Lane LOS		A			A			A			A	
95% Queue, veh		0.1			0.2			0.4			0.5	
Approach Delay, s/veh	4.1			4.3			4.5			4.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	4.5						A					

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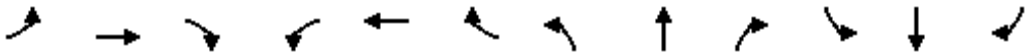
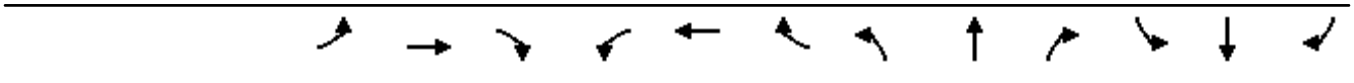


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	20	24	10	16	24	13	75	10	20	64	24
Future Volume (Veh/h)	9	20	24	10	16	24	13	75	10	20	64	24
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	22	26	11	17	26	14	82	11	22	70	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								737			527	
pX, platoon unblocked												
vC, conflicting volume	230	248	48	232	256	46	96			93		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	230	248	48	232	256	46	96			93		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	97	97	98	97	97	99			99		
cM capacity (veh/h)	660	638	1011	655	632	1013	1496			1499		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	58	54	55	52	57	61
Volume Left	10	11	14	0	22	0
Volume Right	26	26	0	11	0	26
cSH	770	778	1496	1700	1499	1700
Volume to Capacity	0.08	0.07	0.01	0.03	0.01	0.04
Queue Length 95th (ft)	6	6	1	0	1	0
Control Delay (s)	10.1	10.0	1.9	0.0	2.9	0.0
Lane LOS	B	A	A		A	
Approach Delay (s)	10.1	10.0	1.0		1.4	
Approach LOS	B	A				

Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	147	6	32	7	66	7	22	736	17
Future Volume (veh/h)	0	0	0	147	6	32	7	66	7	22	736	17
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				165	0	0	8	72	0	24	800	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				1328	0	593	148	1692	527	148	1178	527
Arrive On Green				0.36	0.00	0.00	0.08	0.32	0.00	0.08	0.32	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				165	0	0	8	72	0	24	800	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.4	0.0
Cycle Q Clear(g_c), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.4	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				1328	0	593	148	1692	527	148	1178	527
V/C Ratio(X)				0.12	0.00	0.00	0.05	0.04	0.00	0.16	0.68	0.00
Avail Cap(c_a), veh/h				1328	0	593	148	1692	527	148	1178	527
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				10.7	0.0	0.0	21.3	11.7	0.0	21.4	14.8	0.0
Incr Delay (d2), s/veh				0.2	0.0	0.0	0.7	0.0	0.0	2.4	3.2	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	0.0	0.1	0.2	0.0	0.4	5.3	0.0
LnGrp Delay(d),s/veh				10.9	0.0	0.0	21.9	11.8	0.0	23.8	17.9	0.0
LnGrp LOS				B			C	B		C	B	
Approach Vol, veh/h					165			80			824	
Approach Delay, s/veh					10.9			12.8			18.1	
Approach LOS					B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	20.0			8.0	20.0		22.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	16.0			4.0	16.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	2.5			2.2	11.4		3.5
Green Ext Time (p_c), s	0.0	0.2			0.0	2.2		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	16.6
HCM 2010 LOS	B

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	529	192	454	1080	0	0
Future Volume (veh/h)	529	192	454	1080	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	575	209	493	1174		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1840	823	1074	3313		
Arrive On Green	0.50	0.50	0.30	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	575	209	493	1174		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	3.7	2.9	4.5	1.9		
Cycle Q Clear(g_c), s	3.7	2.9	4.5	1.9		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1840	823	1074	3313		
V/C Ratio(X)	0.31	0.25	0.46	0.35		
Avail Cap(c_a), veh/h	1840	823	1074	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.9	5.7	11.4	0.3		
Incr Delay (d2), s/veh	0.4	0.7	1.4	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.0	1.4	2.4	1.0		
LnGrp Delay(d),s/veh	6.4	6.5	12.8	0.6		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	784			1667		
Approach Delay, s/veh	6.4			4.2		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			16.0	24.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			12.0	20.0				36.0
Max Q Clear Time (g_c+I1), s			6.5	5.7				3.9
Green Ext Time (p_c), s			1.0	4.0				10.8

Intersection Summary	
HCM 2010 Ctrl Delay	4.9
HCM 2010 LOS	A



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	553	67	748	1700	67	1
Future Volume (veh/h)	553	67	748	1700	67	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	601	73	813	1848	73	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	982	439	954	2208	492	439
Arrive On Green	0.27	0.27	0.27	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	601	73	813	1848	73	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	8.6	2.0	12.9	24.2	1.8	0.0
Cycle Q Clear(g_c), s	8.6	2.0	12.9	24.2	1.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	982	439	954	2208	492	439
V/C Ratio(X)	0.61	0.17	0.85	0.84	0.15	0.00
Avail Cap(c_a), veh/h	982	439	954	2208	492	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.3	16.9	20.9	9.6	16.8	0.0
Incr Delay (d2), s/veh	2.8	0.8	9.5	4.0	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	1.0	7.6	13.3	1.0	0.0
LnGrp Delay(d),s/veh	22.1	17.7	30.4	13.6	17.4	0.0
LnGrp LOS	C	B	C	B	B	
Approach Vol, veh/h	674			2661	73	
Approach Delay, s/veh	21.7			18.7	17.4	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		3.8	14.9	10.6				26.2
Green Ext Time (p_c), s		0.1	0.4	2.0				8.0

Intersection Summary	
HCM 2010 Ctrl Delay	19.3
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	294	3	94	510	155	10	0	112	19	31	31
Future Volume (veh/h)	0	294	3	94	510	155	10	0	112	19	31	31
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	320	3	102	554	0	11	0	122	21	34	34
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1150	11	284	1982	887	0	0	0	568	596	507
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3833	35	1845	3681	1647		0		1845	1937	1647
Grp Volume(v), veh/h	0	158	165	102	554	0		0.0		21	34	34
Grp Sat Flow(s),veh/h/ln	0	1840	1931	1845	1840	1647				1845	1937	1647
Q Serve(g_s), s	0.0	3.4	3.4	2.6	4.3	0.0				0.4	0.6	0.8
Cycle Q Clear(g_c), s	0.0	3.4	3.4	2.6	4.3	0.0				0.4	0.6	0.8
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	566	594	284	1982	887				568	596	507
V/C Ratio(X)	0.00	0.28	0.28	0.36	0.28	0.00				0.04	0.06	0.07
Avail Cap(c_a), veh/h	0	566	594	284	1982	887				568	596	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.6	13.6	19.7	6.5	0.0				12.6	12.7	12.7
Incr Delay (d2), s/veh	0.0	1.2	1.2	3.5	0.4	0.0				0.1	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.9	2.0	1.6	2.3	0.0				0.2	0.4	0.4
LnGrp Delay(d),s/veh	0.0	14.8	14.8	23.2	6.9	0.0				12.7	12.9	13.0
LnGrp LOS		B	B	C	A					B	B	B
Approach Vol, veh/h		323			656						89	
Approach Delay, s/veh		14.8			9.4						12.9	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			4.6	5.4		2.8		6.3
Green Ext Time (p_c), s			0.1	1.3		0.2		3.8

Intersection Summary	
HCM 2010 Ctrl Delay	11.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	236	499	5	9	657	332	10	10	19	129	2	58
Future Volume (veh/h)	236	499	5	9	657	332	10	10	19	129	2	58
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	257	542	5	10	714	361	11	11	21	102	54	63
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	271	1146	11	98	785	351	202	202	351	394	174	203
Arrive On Green	0.15	0.31	0.31	0.05	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	1845	3737	34	1845	3681	1647	945	945	1647	1845	817	953
Grp Volume(v), veh/h	257	267	280	10	714	361	22	0	21	102	0	117
Grp Sat Flow(s),veh/h/ln	1845	1840	1931	1845	1840	1647	1890	0	1647	1845	0	1769
Q Serve(g_s), s	10.4	8.8	8.8	0.4	14.2	16.0	0.7	0.0	0.8	3.5	0.0	4.2
Cycle Q Clear(g_c), s	10.4	8.8	8.8	0.4	14.2	16.0	0.7	0.0	0.8	3.5	0.0	4.2
Prop In Lane	1.00		0.02	1.00		1.00	0.50		1.00	1.00		0.54
Lane Grp Cap(c), veh/h	271	564	592	98	785	351	403	0	351	394	0	377
V/C Ratio(X)	0.95	0.47	0.47	0.10	0.91	1.03	0.05	0.00	0.06	0.26	0.00	0.31
Avail Cap(c_a), veh/h	271	564	592	98	785	351	403	0	351	394	0	377
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.7	21.1	21.1	33.8	28.8	29.5	23.5	0.0	23.5	24.6	0.0	24.9
Incr Delay (d2), s/veh	43.2	2.8	2.7	2.1	16.4	55.3	0.3	0.0	0.3	1.6	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.5	4.9	5.1	0.3	8.9	12.6	0.4	0.0	0.4	1.9	0.0	2.3
LnGrp Delay(d),s/veh	74.9	23.9	23.8	35.8	45.2	84.8	23.7	0.0	23.8	26.2	0.0	27.0
LnGrp LOS	E	C	C	D	D	F	C		C	C		C
Approach Vol, veh/h		804			1085			43			219	
Approach Delay, s/veh		40.2			58.3			23.8			26.6	
Approach LOS		D			E			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	27.0		20.0	15.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	23.0		16.0	11.0	16.0
Max Q Clear Time (g_c+I1), s		2.8	2.4	10.8		6.2	12.4	18.0
Green Ext Time (p_c), s		0.1	0.0	2.6		0.6	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	47.6
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	412	293	84	815	172	260	128	80	212	269	189
Future Volume (veh/h)	73	412	293	84	815	172	260	128	80	212	269	189
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	79	448	318	91	886	187	211	240	87	230	292	205
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	472	333	132	894	400	448	470	400	422	443	376
Arrive On Green	0.06	0.23	0.23	0.07	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23
Sat Flow, veh/h	1845	2064	1457	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	79	399	367	91	886	187	211	240	87	230	292	205
Grp Sat Flow(s),veh/h/ln	1845	1840	1680	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.0	15.0	15.1	3.4	16.8	6.8	6.8	7.5	3.0	7.7	9.6	7.7
Cycle Q Clear(g_c), s	3.0	15.0	15.1	3.4	16.8	6.8	6.8	7.5	3.0	7.7	9.6	7.7
Prop In Lane	1.00		0.87	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	421	384	132	894	400	448	470	400	422	443	376
V/C Ratio(X)	0.75	0.95	0.95	0.69	0.99	0.47	0.47	0.51	0.22	0.55	0.66	0.54
Avail Cap(c_a), veh/h	105	421	384	132	894	400	448	470	400	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	26.6	26.6	31.7	26.4	22.6	22.7	22.9	21.2	23.8	24.5	23.8
Incr Delay (d2), s/veh	38.1	32.8	35.9	25.7	28.0	3.9	3.5	3.9	1.2	5.0	7.5	5.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	11.4	10.8	2.7	12.0	3.5	3.9	4.5	1.5	4.5	6.0	4.1
LnGrp Delay(d),s/veh	70.6	59.4	62.5	57.5	54.5	26.5	26.2	26.8	22.4	28.8	32.0	29.4
LnGrp LOS	E	E	E	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		845			1164			538			727	
Approach Delay, s/veh		61.8			50.2			25.9			30.3	
Approach LOS		E			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	20.0		20.0	8.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	16.0		16.0	4.0	17.0
Max Q Clear Time (g_c+I1), s		9.5	5.4	17.1		11.6	5.0	18.8
Green Ext Time (p_c), s		1.5	0.0	0.0		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	44.8
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	88	7	14	66	40	2	2	5	0	0	0
Future Vol, veh/h	25	88	7	14	66	40	2	2	5	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	96	8	15	72	43	2	2	5	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.8	7.5	7.2
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	22%	21%	12%
Vol Thru, %	22%	73%	55%
Vol Right, %	56%	6%	33%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	9	120	120
LT Vol	2	25	14
Through Vol	2	88	66
RT Vol	5	7	40
Lane Flow Rate	10	130	130
Geometry Grp	1	1	1
Degree of Util (X)	0.011	0.147	0.14
Departure Headway (Hd)	4.19	4.055	3.872
Convergence, Y/N	Yes	Yes	Yes
Cap	859	884	925
Service Time	2.19	2.08	1.902
HCM Lane V/C Ratio	0.012	0.147	0.141
HCM Control Delay	7.2	7.8	7.5
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.5	0.5

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	133	66	43	54	0	0	0	0	16	0	54
Future Vol, veh/h	0	133	66	43	54	0	0	0	0	16	0	54
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	145	72	47	59	0	0	0	0	17	0	59

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	145	0	0			298	298	59
Stage 1	-	-	-	-	-	-			153	153	-
Stage 2	-	-	-	-	-	-			145	145	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1437	-	0			693	614	1007
Stage 1	0	-	-	-	-	0			875	771	-
Stage 2	0	-	-	-	-	0			882	777	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1437	-	-			669	0	1007
Mov Cap-2 Maneuver	-	-	-	-	-	-			669	0	-
Stage 1	-	-	-	-	-	-			845	0	-
Stage 2	-	-	-	-	-	-			882	0	-

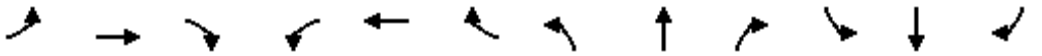
Approach	EB	WB	SB
HCM Control Delay, s	0	3.4	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1437	-	669	1007
HCM Lane V/C Ratio	-	-	0.033	-	0.026	0.058
HCM Control Delay (s)	-	-	7.6	0	10.5	8.8
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	392	145	179	932	12	170
Future Volume (veh/h)	392	145	179	932	12	170
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	426	0	195	1013	13	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1595	714	358	1162	492	773
Arrive On Green	0.43	0.00	0.10	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	426	0	195	1013	13	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	4.5	0.0	3.1	26.3	0.3	0.0
Cycle Q Clear(g_c), s	4.5	0.0	3.1	26.3	0.3	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1595	714	358	1162	492	773
V/C Ratio(X)	0.27	0.00	0.54	0.87	0.03	0.00
Avail Cap(c_a), veh/h	1595	714	358	1162	492	773
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	10.9	0.0	25.7	10.1	16.2	0.0
Incr Delay (d2), s/veh	0.4	0.0	5.9	9.1	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	1.8	16.7	0.2	0.0
LnGrp Delay(d),s/veh	11.3	0.0	31.6	19.1	16.3	0.0
LnGrp LOS	B		C	B	B	
Approach Vol, veh/h	426			1208	13	
Approach Delay, s/veh	11.3			21.1	16.3	
Approach LOS	B			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	10.0	30.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	6.0	26.0				36.0
Max Q Clear Time (g_c+I1), s		2.3	5.1	6.5				28.3
Green Ext Time (p_c), s		0.0	0.1	2.7				4.5

Intersection Summary	
HCM 2010 Ctrl Delay	18.6
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	272	107	194	477	306	1673	214	38	179	121	74	78
Future Volume (vph)	272	107	194	477	306	1673	214	38	179	121	74	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3018	1441		1787	1583		1807	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3018	1441		1787	1583		1807	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	296	116	211	518	333	1818	233	41	195	132	80	85
RTOR Reduction (vph)	0	0	190	0	496	501	0	0	117	0	0	71
Lane Group Flow (vph)	296	116	21	518	746	408	0	274	78	0	212	14
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	16.9	9.8	9.8	33.7	28.2	28.2		21.2	21.2		17.0	17.0
Effective Green, g (s)	16.9	9.8	9.8	33.7	28.2	28.2		21.2	21.2		17.0	17.0
Actuated g/C Ratio	0.17	0.10	0.10	0.34	0.28	0.28		0.21	0.21		0.17	0.17
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	299	182	155	596	851	406		378	335		307	269
v/s Ratio Prot	0.17	0.06		c0.29	0.25			c0.15			c0.12	
v/s Ratio Perm			0.01			c0.28			0.05			0.01
v/c Ratio	0.99	0.64	0.13	0.87	0.99dr	1.00		0.72	0.23		0.69	0.05
Uniform Delay, d1	41.5	43.4	41.2	31.1	34.2	35.9		36.7	32.7		39.0	34.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	48.7	5.3	0.1	12.8	9.8	45.8		11.5	1.6		12.0	0.4
Delay (s)	90.2	48.7	41.4	43.9	44.0	81.7		48.2	34.3		51.1	35.1
Level of Service	F	D	D	D	D	F		D	C		D	D
Approach Delay (s)		65.9			56.8			42.4			46.5	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	55.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.3
Intersection Capacity Utilization	108.9%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	673	0	324	0	0	438	685	0	557	561	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	0	0	0	0	746	0	352	0	0	486	759	0	618	622	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929		4.6453	4.3276			4.3276		4.6453	4.3276	
Follow-Up Headway (s)		3.1858		2.6667	2.5352			2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		0		0	746	352		486	759	618	622	
Entry Volume veh/h		0		0	731	352		476	744	606	610	
Circulating Flow (v_c), pc/h	1986			486			618			746		
Exiting Flow (v_{ex}), pc/h	618			0			486			1368		
Capacity (c_{pce}), pc/h		155		863	939			840		680	753	
Capacity (c), veh/h		152		846	921			823		666	738	
v/c Ratio (x)		0.00		0.00	0.79			0.58		0.91	0.83	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.7		4.3	21.1	0.0		13.1	0.0	40.8	27.7	
Lane LOS		C		A	C	A		B	A	E	D	
95% Queue, veh		0.0		0.0	8.5			3.8		11.8	9.1	
Approach Delay, s/veh				14.2			5.1			34.2		
Approach LOS				B			A			D		
Intersection Delay, s/veh | LOS	18.0						C					

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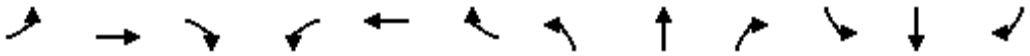

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	21	11	93	37	161	18	105	98	185	143	12
Future Volume (vph)	0	21	11	93	37	161	18	105	98	185	143	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	12	101	40	175	20	114	107	201	155	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	35	316	241	369
Volume Left (vph)	0	101	20	201
Volume Right (vph)	12	175	107	13
Hadj (s)	-0.17	-0.23	-0.22	0.12
Departure Headway (s)	6.0	5.4	5.3	5.4
Degree Utilization, x	0.06	0.47	0.35	0.55
Capacity (veh/h)	487	623	625	635
Control Delay (s)	9.4	13.0	11.1	14.9
Approach Delay (s)	9.4	13.0	11.1	14.9
Approach LOS	A	B	B	B

Intersection Summary				
Delay	13.1			
Level of Service	B			
Intersection Capacity Utilization	64.6%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	248	67	104	14	59	34	73	742	21	54	750	179
Future Volume (vph)	248	67	104	14	59	34	73	742	21	54	750	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1792	1583		1771		1770	1855		1770	1863	1583
Flt Permitted		0.72	1.00		0.95		0.14	1.00		0.14	1.00	1.00
Satd. Flow (perm)		1344	1583		1695		255	1855		255	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	270	73	113	15	64	37	79	807	23	59	815	195
RTOR Reduction (vph)	0	0	73	0	24	0	0	1	0	0	0	88
Lane Group Flow (vph)	0	343	40	0	92	0	79	829	0	59	815	107
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		21.2	21.2		21.2		31.6	31.6		32.8	32.8	32.8
Effective Green, g (s)		21.2	21.2		21.2		31.6	31.6		32.8	32.8	32.8
Actuated g/C Ratio		0.35	0.35		0.35		0.53	0.53		0.55	0.55	0.55
Clearance Time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		7.0	7.0	7.0
Lane Grp Cap (vph)		474	559		598		134	976		139	1018	865
v/s Ratio Prot								c0.45			0.44	
v/s Ratio Perm		c0.26	0.03		0.05		0.31			0.23		0.07
v/c Ratio		0.72	0.07		0.15		0.59	0.85		0.42	0.80	0.12
Uniform Delay, d1		16.9	12.9		13.3		9.7	12.2		8.0	11.0	6.6
Progression Factor		1.00	1.00		1.00		0.71	0.76		1.00	1.00	1.00
Incremental Delay, d2		8.5	0.2		0.4		15.7	8.2		9.2	6.6	0.3
Delay (s)		25.3	13.1		13.7		22.6	17.4		17.3	17.6	6.9
Level of Service		C	B		B		C	B		B	B	A
Approach Delay (s)		22.3			13.7			17.8			15.6	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Civic Center Drive
Agency or Co.	IBI Group	E/W Street Name	Civic Center Drive
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	30	29	28	0	24	34	48	0	23	761	44	0	27	794	26
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	33	32	31	0	27	38	53	0	26	844	49	0	30	880	29
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		96			118			919			939	
Entry Volume veh/h		94			116			901			921	
Circulating Flow (v_c), pc/h	937			903			95			91		
Exiting Flow (v_{ex}), pc/h	111			93			930			938		
Capacity (c_{pce}), pc/h		443			458			1028			1032	
Capacity (c), veh/h		434			449			1007			1011	
v/c Ratio (x)		0.22			0.26			0.89			0.91	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		11.7			12.1			29.0			31.1	
Lane LOS		B			B			D			D	
95% Queue, veh		0.8			1.0			12.9			13.7	
Approach Delay, s/veh	11.7			12.1			29.0			31.1		
Approach LOS	B			B			D			D		
Intersection Delay, s/veh | LOS	28.2						D					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Pier View Way
Agency or Co.	IBI Group	E/W Street Name	Pier View Way
Date Performed	7/11/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	99	39	109	0	4	39	10	0	83	804	8	0	5	804	188
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	110	43	121	0	4	43	11	0	92	891	9	0	6	891	208
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		274			58			992			1105	
Entry Volume veh/h		269			57			973			1083	
Circulating Flow (v_c), pc/h	901			1093			159			139		
Exiting Flow (v_{ex}), pc/h	58			343			1012			1016		
Capacity (c_{pce}), pc/h		459			379			964			983	
Capacity (c), veh/h		450			371			945			964	
v/c Ratio (x)		0.60			0.15			1.03			1.12	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		22.1			12.2			57.9			88.2	
Lane LOS		C			B			F			F	
95% Queue, veh		3.8			0.5			20.9			28.9	
Approach Delay, s/veh	22.1			12.2			57.9			88.2		
Approach LOS	C			B			F			F		
Intersection Delay, s/veh | LOS	66.5						F					

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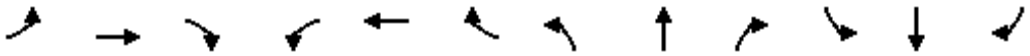


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	11	160	64	11	14	55	399	30	14	359	15
Future Volume (vph)	18	11	160	64	11	14	55	399	30	14	359	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	12	174	70	12	15	60	434	33	15	390	16

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	32	174	97	277	250	210	211
Volume Left (vph)	20	0	70	60	0	15	0
Volume Right (vph)	0	174	15	0	33	0	16
Hadj (s)	0.35	-0.67	0.09	0.14	-0.06	0.07	-0.02
Departure Headway (s)	7.4	6.4	7.2	6.3	6.1	6.3	6.3
Degree Utilization, x	0.07	0.31	0.19	0.48	0.42	0.37	0.37
Capacity (veh/h)	448	520	455	547	574	543	551
Control Delay (s)	9.7	11.0	11.9	13.8	12.2	11.8	11.6
Approach Delay (s)	10.8		11.9	13.1		11.7	
Approach LOS	B		B	B		B	

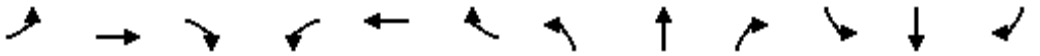
Intersection Summary				
Delay	12.2			
Level of Service	B			
Intersection Capacity Utilization	46.0%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	290	101	184	202	73	215
Future Volume (vph)	290	101	184	202	73	215
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	315	110	200	220	79	234

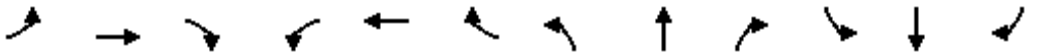
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	315	110	420	313
Volume Left (vph)	315	0	0	79
Volume Right (vph)	0	110	220	0
Hadj (s)	0.53	-0.67	-0.28	0.08
Departure Headway (s)	7.1	5.8	5.5	6.0
Degree Utilization, x	0.62	0.18	0.64	0.52
Capacity (veh/h)	489	585	625	570
Control Delay (s)	19.6	8.9	17.9	15.5
Approach Delay (s)	16.8		17.9	15.5
Approach LOS	C		C	C

Intersection Summary			
Delay	16.9		
Level of Service	C		
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		



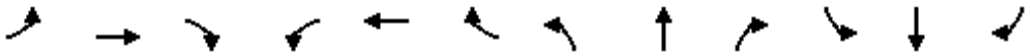
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	0	332	81	305	85	0	0	0	0	126	93
Future Volume (vph)	44	0	332	81	305	85	0	0	0	0	126	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.94	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3424						3314	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3424						3314	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	0	361	88	332	92	0	0	0	0	137	101
RTOR Reduction (vph)	0	0	329	45	38	0	0	0	0	0	86	0
Lane Group Flow (vph)	48	0	32	43	386	0	0	0	0	0	152	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	4.5		4.5	24.4	24.4						7.6	
Effective Green, g (s)	4.5		4.5	24.4	24.4						7.6	
Actuated g/C Ratio	0.09		0.09	0.49	0.49						0.15	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	159		250	863	1670						503	
v/s Ratio Prot	c0.03		0.01	0.02	c0.11						c0.05	
v/s Ratio Perm												
v/c Ratio	0.30		0.13	0.05	0.23						0.30	
Uniform Delay, d1	21.3		20.9	6.7	7.4						18.8	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	1.1		0.2	0.1	0.3						0.3	
Delay (s)	22.4		21.2	6.8	7.7						19.2	
Level of Service	C		C	A	A						B	
Approach Delay (s)		21.3			7.6			0.0			19.2	
Approach LOS		C			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.25		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	174	399	65	258	726	0	0	588	186
Future Volume (vph)	0	0	0	174	399	65	258	726	0	0	588	186
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1519	1770	1863			1760	1455
Flt Permitted				0.95	1.00	1.00	0.12	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1519	219	1863			1760	1455
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	189	434	71	280	789	0	0	639	202
RTOR Reduction (vph)	0	0	0	0	0	54	0	0	0	0	1	59
Lane Group Flow (vph)	0	0	0	189	434	17	280	789	0	0	658	123
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.0	18.0	18.0	48.0	48.0			29.0	29.0
Effective Green, g (s)				18.0	18.0	18.0	48.0	48.0			29.0	29.0
Actuated g/C Ratio				0.24	0.24	0.24	0.63	0.63			0.38	0.38
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				419	838	359	424	1176			671	555
v/s Ratio Prot				0.11	c0.12		0.12	c0.42			c0.37	
v/s Ratio Perm						0.01	0.30					0.08
v/c Ratio				0.45	0.52	0.05	0.66	0.67			0.98	0.22
Uniform Delay, d1				24.8	25.2	22.4	23.0	9.0			23.2	15.9
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				3.5	2.3	0.2	4.2	1.7			29.8	0.3
Delay (s)				28.3	27.5	22.6	27.2	10.6			53.0	16.2
Level of Service				C	C	C	C	B			D	B
Approach Delay (s)		0.0			27.2			15.0			45.0	
Approach LOS		A			C			B			D	

Intersection Summary			
HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	152	0	141	747	313	16	88	339	436	58	23
Future Volume (vph)	19	152	0	141	747	313	16	88	339	436	58	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539		1770	3539	1583		1849	1583	1681	1688	
Flt Permitted	0.25	1.00		0.65	1.00	1.00		0.94	1.00	0.68	0.72	
Satd. Flow (perm)	459	3539		1206	3539	1583		1755	1583	1211	1264	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	165	0	153	812	340	17	96	368	474	63	25
RTOR Reduction (vph)	0	0	0	0	0	216	0	0	199	0	6	0
Lane Group Flow (vph)	21	165	0	153	812	124	0	113	169	275	281	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	20.5	20.5		20.1	20.1	20.1		25.3	25.3	25.3	25.3	
Effective Green, g (s)	20.5	20.5		20.1	20.1	20.1		25.3	25.3	25.3	25.3	
Actuated g/C Ratio	0.37	0.37		0.37	0.37	0.37		0.46	0.46	0.46	0.46	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	171	1319		440	1293	578		807	728	557	581	
v/s Ratio Prot		0.05			c0.23							
v/s Ratio Perm	0.05			0.13		0.08		0.06	0.11	c0.23	0.22	
v/c Ratio	0.12	0.13		0.35	0.63	0.21		0.14	0.23	0.49	0.48	
Uniform Delay, d1	11.3	11.3		12.7	14.4	12.0		8.6	9.0	10.4	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.6	1.0	0.2		0.4	0.7	3.1	2.9	
Delay (s)	11.8	11.4		13.3	15.4	12.2		8.9	9.7	13.5	13.2	
Level of Service	B	B		B	B	B		A	A	B	B	
Approach Delay (s)		11.5			14.3			9.5			13.3	
Approach LOS		B			B			A			B	

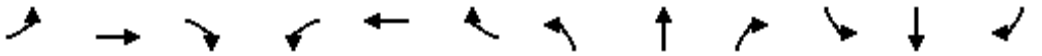
Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	282	15	22	58	23	28
Future Volume (Veh/h)	282	15	22	58	23	28
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	307	16	24	63	25	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			323		426	315
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			323		426	315
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		96	96
cM capacity (veh/h)			1237		574	725

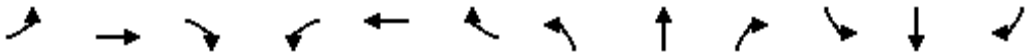
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	323	87	55
Volume Left	0	24	25
Volume Right	16	0	30
cSH	1700	1237	648
Volume to Capacity	0.19	0.02	0.08
Queue Length 95th (ft)	0	1	7
Control Delay (s)	0.0	2.3	11.1
Lane LOS		A	B
Approach Delay (s)	0.0	2.3	11.1
Approach LOS			B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	319	201	203	0	0	0	84	502	151	161	431	104
Future Volume (vph)	319	201	203	0	0	0	84	502	151	161	431	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.94				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1493				1770	1863	1552	1770	1863	1516
Flt Permitted	0.95	1.00	1.00				0.49	1.00	1.00	0.20	1.00	1.00
Satd. Flow (perm)	1770	1863	1493				921	1863	1552	368	1863	1516
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	347	218	221	0	0	0	91	546	164	175	468	113
RTOR Reduction (vph)	0	0	147	0	0	0	0	0	88	0	0	54
Lane Group Flow (vph)	347	218	74	0	0	0	91	546	76	175	468	59
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	20.1	20.1	20.1				23.1	23.1	23.1	31.1	31.1	31.1
Effective Green, g (s)	20.1	20.1	20.1				23.1	23.1	23.1	31.1	31.1	31.1
Actuated g/C Ratio	0.34	0.34	0.34				0.39	0.39	0.39	0.52	0.52	0.52
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	592	624	500				354	717	597	284	965	785
v/s Ratio Prot	c0.20	0.12						c0.29		0.04	c0.25	
v/s Ratio Perm			0.05				0.10		0.05	0.28		0.04
v/c Ratio	0.59	0.35	0.15				0.26	0.76	0.13	0.62	0.48	0.07
Uniform Delay, d1	16.5	15.0	14.0				12.6	16.1	11.9	10.2	9.3	7.2
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.2	1.5	0.6				1.8	7.5	0.4	3.9	1.7	0.2
Delay (s)	20.7	16.6	14.6				14.3	23.5	12.4	14.2	11.0	7.4
Level of Service	C	B	B				B	C	B	B	B	A
Approach Delay (s)		17.8			0.0			20.2			11.2	
Approach LOS		B			A			C			B	

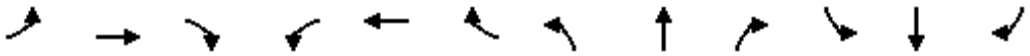
Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	561	36	0	0	0	0	9	37	26	26	0
Future Volume (Veh/h)	14	561	36	0	0	0	0	9	37	26	26	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	610	39	0	0	0	0	10	40	28	28	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			649			674	660	324	380	679	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			649			674	660	324	380	679	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	94	92	100
cM capacity (veh/h)	1622			933			319	378	671	505	369	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	320	344	50	56
Volume Left	15	0	0	28
Volume Right	0	39	40	0
cSH	1622	1700	581	426
Volume to Capacity	0.01	0.20	0.09	0.13
Queue Length 95th (ft)	1	0	7	11
Control Delay (s)	0.4	0.0	11.8	14.7
Lane LOS	A		B	B
Approach Delay (s)	0.2		11.8	14.7
Approach LOS			B	B

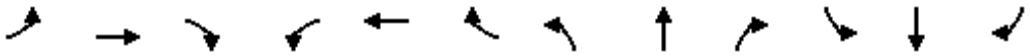
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	33.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	36	1249	26	0	0	0	0	12	33	57	45	0
Future Volume (vph)	36	1249	26	0	0	0	0	12	33	57	45	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	1358	28	0	0	0	0	13	36	62	49	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	718	707	49	111
Volume Left (vph)	39	0	0	62
Volume Right (vph)	0	28	36	0
Hadj (s)	0.06	0.01	-0.41	0.15
Departure Headway (s)	5.1	5.0	5.6	6.0
Degree Utilization, x	1.01	0.98	0.08	0.18
Capacity (veh/h)	704	707	630	586
Control Delay (s)	56.9	50.1	9.0	10.3
Approach Delay (s)	53.5		9.0	10.3
Approach LOS	F		A	B

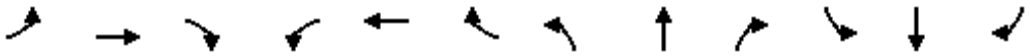
Intersection Summary				
Delay	49.1			
Level of Service	E			
Intersection Capacity Utilization	55.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	291	524	12	39	0	21	0	18	11	0	0	0
Future Volume (vph)	291	524	12	39	0	21	0	18	11	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	316	570	13	42	0	23	0	20	12	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	316	583	65	32
Volume Left (vph)	316	0	42	0
Volume Right (vph)	0	13	23	12
Hadj (s)	0.53	0.02	-0.05	-0.19
Departure Headway (s)	5.2	4.7	4.8	5.4
Degree Utilization, x	0.45	0.75	0.09	0.05
Capacity (veh/h)	691	760	737	623
Control Delay (s)	11.2	19.3	8.2	8.7
Approach Delay (s)	16.5		8.2	8.7
Approach LOS	C		A	A

Intersection Summary				
Delay	15.7			
Level of Service	C			
Intersection Capacity Utilization	45.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	43	0	0	32	19	535	47	23	490	20
Future Volume (Veh/h)	0	0	43	0	0	32	19	535	47	23	490	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	47	0	0	35	21	582	51	25	533	22
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked	0.84	0.84	0.84	0.84	0.84		0.84					
vC, conflicting volume	1260	1283	551	1286	1268	614	562			640		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1213	1241	366	1245	1223	614	379			640		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	93	98			97		
cM capacity (veh/h)	117	138	565	110	141	488	981			937		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	47	35	21	633	25	555
Volume Left	0	0	21	0	25	0
Volume Right	47	35	0	51	0	22
cSH	565	488	981	1700	937	1700
Volume to Capacity	0.08	0.07	0.02	0.37	0.03	0.33
Queue Length 95th (ft)	7	6	2	0	2	0
Control Delay (s)	11.9	13.0	8.7	0.0	8.9	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	11.9	13.0	0.3		0.4	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	41.1%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Washington Avenue
Agency or Co.	IBI Group	E/W Street Name	Washington Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	13	0	64	0	45	10	12	0	42	513	19	0	24	466	55
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	14	0	71	0	50	11	13	0	47	569	21	0	27	517	61
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		85			74			637			605	
Entry Volume veh/h		83			73			625			593	
Circulating Flow (v_c), pc/h	594			630			41			108		
Exiting Flow (v_{ex}), pc/h	48			119			596			638		
Capacity (c_{pce}), pc/h		624			602			1085			1014	
Capacity (c), veh/h		612			590			1063			994	
v/c Ratio (x)		0.14			0.12			0.59			0.60	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.5			7.6			11.0			11.8	
Lane LOS		A			A			B			B	
95% Queue, veh		0.5			0.4			4.0			4.1	
Approach Delay, s/veh	7.5			7.6			11.0			11.8		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh | LOS	11.0						B					

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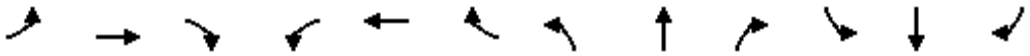
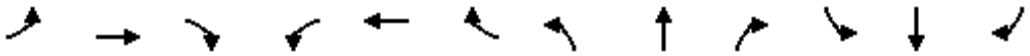


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	46	74	28	87	6	131	4	264	70	156	163	2
Future Volume (vph)	46	74	28	87	6	131	4	264	70	156	163	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	80	30	95	7	142	4	287	76	170	177	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	160	244	367	349
Volume Left (vph)	50	95	4	170
Volume Right (vph)	30	142	76	2
Hadj (s)	-0.02	-0.24	-0.09	0.13
Departure Headway (s)	6.6	6.2	5.8	6.1
Degree Utilization, x	0.30	0.42	0.60	0.59
Capacity (veh/h)	458	507	577	551
Control Delay (s)	12.4	13.6	17.1	17.4
Approach Delay (s)	12.4	13.6	17.1	17.4
Approach LOS	B	B	C	C

Intersection Summary				
Delay	15.8			
Level of Service	C			
Intersection Capacity Utilization	64.7%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	320	35	16	223	35	34	55	54	28	73	14
Future Volume (Veh/h)	12	320	35	16	223	35	34	55	54	28	73	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	348	38	17	242	38	37	60	59	30	79	15
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked	0.98						0.98	0.98		0.98	0.98	0.98
vC, conflicting volume	294			393			750	728	374	791	728	276
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	272			393			737	714	374	778	714	254
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			85	82	91	87	76	98
cM capacity (veh/h)	1253			1159			254	336	668	232	336	761

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	399	297	156	124
Volume Left	13	17	37	30
Volume Right	38	38	59	15
cSH	1253	1159	378	323
Volume to Capacity	0.01	0.01	0.41	0.38
Queue Length 95th (ft)	1	1	49	44
Control Delay (s)	0.4	0.6	21.1	23.0
Lane LOS	A	A	C	C
Approach Delay (s)	0.4	0.6	21.1	23.0
Approach LOS			C	C

Intersection Summary				
Average Delay	6.6			
Intersection Capacity Utilization	40.1%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Wisconsin Avenue
Agency or Co.	IBI Group	E/W Street Name	Wisconsin Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	100	137	177	0	133	110	23	0	156	483	144	0	25	483	49
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	111	152	196	0	147	122	26	0	173	536	160	0	28	536	54
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		459			295			869			618	
Entry Volume veh/h		450			289			852			606	
Circulating Flow (v_c), pc/h	711			820			291			442		
Exiting Flow (v_{ex}), pc/h	340			349			673			879		
Capacity (c_{pce}), pc/h		555			498			845			726	
Capacity (c), veh/h		544			488			828			712	
v/c Ratio (x)		0.83			0.59			1.03			0.85	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		34.9			20.5			61.1			31.1	
Lane LOS		D			C			F			D	
95% Queue, veh		8.4			3.8			19.4			9.8	
Approach Delay, s/veh	34.9			20.5			61.1			31.1		
Approach LOS	D			C			F			D		
Intersection Delay, s/veh | LOS	42.1						E					

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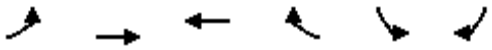
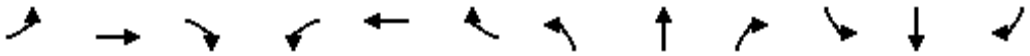


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	505	376	23	34	35
Future Volume (Veh/h)	8	505	376	23	34	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	549	409	25	37	38
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	442				998	430
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	442				998	430
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				86	94
cM capacity (veh/h)	1111				266	620

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	558	434	75
Volume Left	9	0	37
Volume Right	0	25	38
cSH	1111	1700	375
Volume to Capacity	0.01	0.26	0.20
Queue Length 95th (ft)	1	0	18
Control Delay (s)	0.2	0.0	17.0
Lane LOS	A		C
Approach Delay (s)	0.2	0.0	17.0
Approach LOS			C

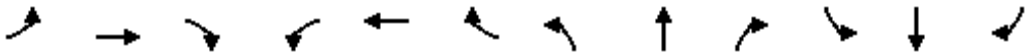
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	44.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	524	4	2	350	33	2	1	4	49	0	39
Future Volume (Veh/h)	29	524	4	2	350	33	2	1	4	49	0	39
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	570	4	2	380	36	2	1	4	53	0	42
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	418			574			1082	1058	572	1044	1042	402
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	418			574			1082	1058	572	1044	1042	402
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			99	100	99	73	100	93
cM capacity (veh/h)	1139			999			178	218	520	199	222	646

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	606	418	7	95
Volume Left	32	2	2	53
Volume Right	4	36	4	42
cSH	1139	999	297	287
Volume to Capacity	0.03	0.00	0.02	0.33
Queue Length 95th (ft)	2	0	2	35
Control Delay (s)	0.8	0.1	17.4	23.6
Lane LOS	A	A	C	C
Approach Delay (s)	0.8	0.1	17.4	23.6
Approach LOS			C	C

Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	64.9%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	282	307	84	204	0	183	0	117	0	0	0
Future Volume (vph)	0	282	307	84	204	0	183	0	117	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	307	334	91	222	0	199	0	127	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	641	313	326	0
Volume Left (vph)	0	91	199	0
Volume Right (vph)	334	0	127	0
Hadj (s)	-0.28	0.09	-0.08	0.00
Departure Headway (s)	5.3	6.1	6.3	7.6
Degree Utilization, x	0.95	0.53	0.57	0.00
Capacity (veh/h)	668	574	547	426
Control Delay (s)	45.3	15.9	17.5	10.6
Approach Delay (s)	45.3	15.9	17.5	0.0
Approach LOS	E	C	C	A

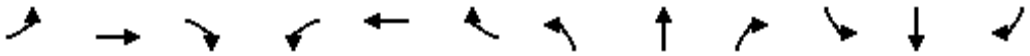
Intersection Summary				
Delay	31.0			
Level of Service	D			
Intersection Capacity Utilization	83.0%	ICU Level of Service	E	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	66	135	192	97	98	187
Future Volume (vph)	66	135	192	97	98	187
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	72	147	209	105	107	203

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	219	314	310
Volume Left (vph)	72	0	107
Volume Right (vph)	147	105	0
Hadj (s)	-0.30	-0.17	0.10
Departure Headway (s)	5.1	4.7	5.0
Degree Utilization, x	0.31	0.41	0.43
Capacity (veh/h)	645	726	688
Control Delay (s)	10.3	11.0	11.7
Approach Delay (s)	10.3	11.0	11.7
Approach LOS	B	B	B

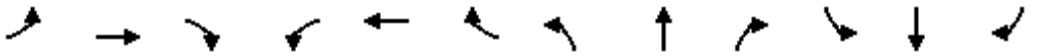
Intersection Summary			
Delay	11.1		
Level of Service	B		
Intersection Capacity Utilization	53.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	366	21	19	302	70	29	42	38	77	26	21
Future Volume (Veh/h)	14	366	21	19	302	70	29	42	38	77	26	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	398	23	21	328	76	32	46	41	84	28	23
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.88						0.88	0.88		0.88	0.88	0.88
vC, conflicting volume	407			432			900	900	428	922	873	373
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	256			432			816	816	428	843	786	217
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			86	82	93	56	90	97
cM capacity (veh/h)	1147			1117			221	262	616	193	272	719

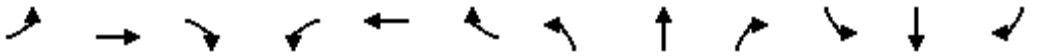
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	436	425	119	135
Volume Left	15	21	32	84
Volume Right	23	76	41	23
cSH	1147	1117	308	237
Volume to Capacity	0.01	0.02	0.39	0.57
Queue Length 95th (ft)	1	1	44	80
Control Delay (s)	0.4	0.6	23.9	38.6
Lane LOS	A	A	C	E
Approach Delay (s)	0.4	0.6	23.9	38.6
Approach LOS			C	E

Intersection Summary				
Average Delay	7.6			
Intersection Capacity Utilization	48.5%	ICU Level of Service	A	
Analysis Period (min)	15			



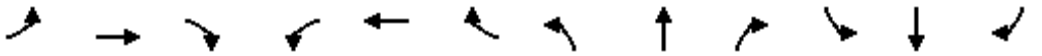
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	211	83	205	205	162	87	441	132	167	375	28
Future Volume (vph)	53	211	83	205	205	162	87	441	132	167	375	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	10	11	11	16	16	16
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844	1537	1681	1762	1794	1652	3289		2006	2089	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1844	1537	1681	1762	1794	1652	3289		2006	2089	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	229	90	223	223	176	95	479	143	182	408	30
RTOR Reduction (vph)	0	0	72	0	0	143	0	35	0	0	3	0
Lane Group Flow (vph)	0	287	18	201	245	33	95	587	0	182	435	0
Confl. Peds. (#/hr)			10	10					3			
Confl. Bikes (#/hr)			4						3			
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		15.6	15.6	15.2	15.2	15.2	6.7	22.3		8.1	23.7	
Effective Green, g (s)		15.6	15.6	15.2	15.2	15.2	6.7	22.3		8.1	23.7	
Actuated g/C Ratio		0.19	0.19	0.19	0.19	0.19	0.08	0.28		0.10	0.30	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		359	299	319	334	340	138	916		203	618	
v/s Ratio Prot		c0.16		0.12	c0.14		0.06	0.18		c0.09	c0.21	
v/s Ratio Perm			0.01			0.02						
v/c Ratio		0.80	0.06	0.63	0.73	0.10	0.69	0.64		0.90	0.70	
Uniform Delay, d1		30.7	26.2	29.8	30.5	26.7	35.6	25.3		35.5	25.0	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		11.0	0.0	4.2	8.3	0.2	10.8	3.4		35.8	6.6	
Delay (s)		41.7	26.3	34.0	38.8	26.9	46.4	28.8		71.3	31.6	
Level of Service		D	C	C	D	C	D	C		E	C	
Approach Delay (s)		38.0			33.9			31.1			43.3	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	36.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



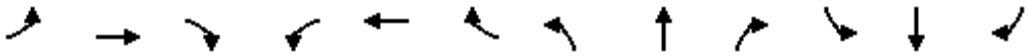
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	629	6	24	699	236	9	20	62	441	16	108
Future Volume (vph)	54	629	6	24	699	236	9	20	62	441	16	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.96			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3532		1761	3393			3133			1776	1524
Flt Permitted	0.19	1.00		0.29	1.00			0.91			0.66	1.00
Satd. Flow (perm)	348	3532		543	3393			2877			1226	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	59	684	7	26	760	257	10	22	67	479	17	117
RTOR Reduction (vph)	0	1	0	0	59	0	0	35	0	0	0	42
Lane Group Flow (vph)	59	690	0	26	958	0	0	64	0	0	496	75
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	21.4	21.4		21.4	21.4			29.1			29.1	29.1
Effective Green, g (s)	21.4	21.4		21.4	21.4			29.1			29.1	29.1
Actuated g/C Ratio	0.36	0.36		0.36	0.36			0.49			0.49	0.49
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	124	1259		193	1210			1395			594	739
v/s Ratio Prot		0.20			c0.28							
v/s Ratio Perm	0.17			0.05				0.02			c0.40	0.05
v/c Ratio	0.48	0.55		0.13	0.79			0.05			0.84	0.10
Uniform Delay, d1	15.0	15.4		13.0	17.3			8.1			13.4	8.4
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	2.9	0.5		0.3	3.6			0.1			13.0	0.3
Delay (s)	17.8	15.9		13.4	20.9			8.2			26.4	8.6
Level of Service	B	B		B	C			A			C	A
Approach Delay (s)		16.1			20.8			8.2			23.0	
Approach LOS		B			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	19	15	68	19	235	20	514	125	299	536	19
Future Volume (vph)	42	19	15	68	19	235	20	514	125	299	536	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	10	11	16
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1760			1789	1794	1770	3873		1652	3403	
Flt Permitted		0.78			0.80	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1403			1484	1794	1770	3873		1652	3403	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	21	16	74	21	255	22	559	136	325	583	21
RTOR Reduction (vph)	0	13	0	0	0	216	0	27	0	0	2	0
Lane Group Flow (vph)	0	70	0	0	95	39	22	668	0	325	602	0
Confl. Peds. (#/hr)			4	4					3			
Confl. Bikes (#/hr)			1						2			
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		9.0			9.0	9.0	0.6	22.0		14.1	35.5	
Effective Green, g (s)		9.0			9.0	9.0	0.6	22.0		14.1	35.5	
Actuated g/C Ratio		0.15			0.15	0.15	0.01	0.37		0.24	0.60	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		214			227	274	18	1449		396	2054	
v/s Ratio Prot							0.01	c0.17		c0.20	0.18	
v/s Ratio Perm		0.05			c0.06	0.02						
v/c Ratio		0.33			0.42	0.14	1.22	0.46		0.82	0.29	
Uniform Delay, d1		22.2			22.5	21.6	29.1	13.9		21.2	5.6	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.5	0.1	289.8	0.2		12.8	0.1	
Delay (s)		22.5			23.0	21.6	318.9	14.1		33.9	5.7	
Level of Service		C			C	C	F	B		C	A	
Approach Delay (s)		22.5			22.0			23.5			15.6	
Approach LOS		C			C			C			B	

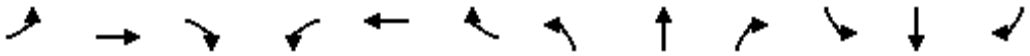
Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	58.8	Sum of lost time (s)	13.7
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	380	65	70	231	0	143	0	121	0	0	0
Future Volume (Veh/h)	0	380	65	70	231	0	143	0	121	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	413	71	76	251	0	155	0	132	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	251			484			852	852	448	984	887	251
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	251			484			852	852	448	984	887	251
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			93			41	100	78	100	100	100
cM capacity (veh/h)	1314			1079			265	276	610	169	263	788

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	484	327	287	0
Volume Left	0	76	155	0
Volume Right	71	0	132	0
cSH	1314	1079	358	1700
Volume to Capacity	0.00	0.07	0.80	0.00
Queue Length 95th (ft)	0	6	171	0
Control Delay (s)	0.0	2.5	45.4	0.0
Lane LOS		A	E	A
Approach Delay (s)	0.0	2.5	45.4	0.0
Approach LOS			E	A

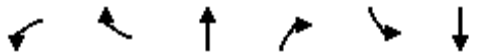
Intersection Summary			
Average Delay	12.6		
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	206	47	0	80	0	47	2	15	0	0	0
Future Volume (Veh/h)	0	206	47	0	80	0	47	2	15	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	224	51	0	87	0	51	2	16	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	87			275			336	336	250	354	362	87
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	87			275			336	336	250	354	362	87
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			92	100	98	100	100	100
cM capacity (veh/h)	1509			1288			617	584	789	588	565	971

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	275	87	69	0
Volume Left	0	0	51	0
Volume Right	51	0	16	0
cSH	1509	1288	649	1700
Volume to Capacity	0.00	0.00	0.11	0.00
Queue Length 95th (ft)	0	0	9	0
Control Delay (s)	0.0	0.0	11.2	0.0
Lane LOS			B	A
Approach Delay (s)	0.0	0.0	11.2	0.0
Approach LOS			B	A

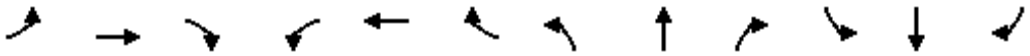
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	24.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	66	256	21	38	306	21
Future Volume (vph)	66	256	21	38	306	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	72	278	23	41	333	23

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	350	64	356
Volume Left (vph)	72	0	333
Volume Right (vph)	278	41	0
Hadj (s)	-0.40	-0.35	0.22
Departure Headway (s)	4.6	4.9	5.1
Degree Utilization, x	0.45	0.09	0.50
Capacity (veh/h)	739	663	676
Control Delay (s)	11.2	8.4	13.1
Approach Delay (s)	11.2	8.4	13.1
Approach LOS	B	A	B

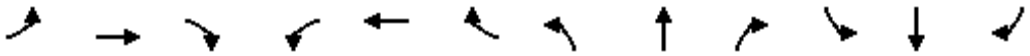
Intersection Summary			
Delay	11.8		
Level of Service	B		
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	163	156	21	128	22	212	28	27	6	20	34
Future Volume (Veh/h)	13	163	156	21	128	22	212	28	27	6	20	34
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	177	170	23	139	24	230	30	29	7	22	37
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	163			347			535	499	262	531	572	151
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	163			347			535	499	262	531	572	151
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			44	93	96	98	95	96
cM capacity (veh/h)	1416			1212			411	460	777	411	418	895

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	361	186	289	66
Volume Left	14	23	230	7
Volume Right	170	24	29	37
cSH	1416	1212	436	594
Volume to Capacity	0.01	0.02	0.66	0.11
Queue Length 95th (ft)	1	1	117	9
Control Delay (s)	0.4	1.1	28.0	11.8
Lane LOS	A	A	D	B
Approach Delay (s)	0.4	1.1	28.0	11.8
Approach LOS			D	B

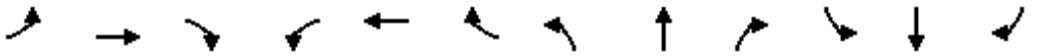
Intersection Summary				
Average Delay	10.2			
Intersection Capacity Utilization	48.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	114	12	36	95	13	7	11	34	6	5	2
Future Volume (Veh/h)	2	114	12	36	95	13	7	11	34	6	5	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	124	13	39	103	14	8	12	37	7	5	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	117			137			327	330	130	366	329	110
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	117			137			327	330	130	366	329	110
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			99	98	96	99	99	100
cM capacity (veh/h)	1471			1447			607	573	919	546	573	943

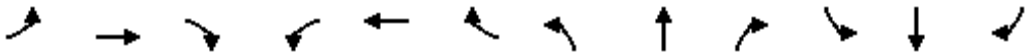
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	139	156	57	14
Volume Left	2	39	8	7
Volume Right	13	14	37	2
cSH	1471	1447	766	592
Volume to Capacity	0.00	0.03	0.07	0.02
Queue Length 95th (ft)	0	2	6	2
Control Delay (s)	0.1	2.1	10.1	11.2
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	2.1	10.1	11.2
Approach LOS			B	B

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	28.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	79	59	93	46	18	66	403	57	72	319	23
Future Volume (vph)	90	79	59	93	46	18	66	403	57	72	319	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.98		1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1763			1781		1770	3473		1770	3504	
Flt Permitted		0.84			0.70		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1505			1283		1770	3473		1770	3504	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	86	64	101	50	20	72	438	62	78	347	25
RTOR Reduction (vph)	0	19	0	0	7	0	0	17	0	0	7	0
Lane Group Flow (vph)	0	229	0	0	164	0	72	483	0	78	365	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		10.2			9.8		5.1	16.9		3.8	15.4	
Effective Green, g (s)		10.2			9.8		5.1	16.9		3.8	15.4	
Actuated g/C Ratio		0.23			0.22		0.11	0.38		0.09	0.35	
Clearance Time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		344			282		202	1318		151	1212	
v/s Ratio Prot							0.04	c0.14		c0.04	0.10	
v/s Ratio Perm		c0.15			0.13							
v/c Ratio		0.66			0.58		0.36	0.37		0.52	0.30	
Uniform Delay, d1		15.6			15.5		18.2	9.9		19.5	10.6	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		4.8			3.2		0.4	0.2		3.0	0.1	
Delay (s)		20.4			18.8		18.6	10.1		22.4	10.8	
Level of Service		C			B		B	B		C	B	
Approach Delay (s)		20.4			18.8			11.2			12.8	
Approach LOS		C			B			B			B	

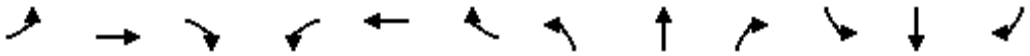
Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	44.5	Sum of lost time (s)	14.2
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	204	75	75	92	28	87	119	34	44	46	50
Future Volume (Veh/h)	50	204	75	75	92	28	87	119	34	44	46	50
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	54	222	82	82	100	30	95	129	37	48	50	54
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	130			304			729	665	263	752	691	115
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	130			304			729	665	263	752	691	115
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			93			64	62	95	77	85	94
cM capacity (veh/h)	1455			1257			261	343	776	204	331	937

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	358	212	261	152
Volume Left	54	82	95	48
Volume Right	82	30	37	54
cSH	1455	1257	331	343
Volume to Capacity	0.04	0.07	0.79	0.44
Queue Length 95th (ft)	3	5	161	55
Control Delay (s)	1.4	3.5	46.5	23.6
Lane LOS	A	A	E	C
Approach Delay (s)	1.4	3.5	46.5	23.6
Approach LOS			E	C

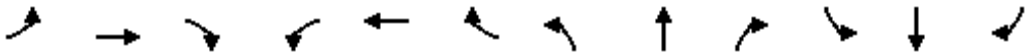
Intersection Summary				
Average Delay	17.3			
Intersection Capacity Utilization	47.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	116	32	39	55	3	43	53	39	4	23	7
Future Volume (vph)	10	116	32	39	55	3	43	53	39	4	23	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	126	35	42	60	3	47	58	42	4	25	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	172	105	147	37
Volume Left (vph)	11	42	47	4
Volume Right (vph)	35	3	42	8
Hadj (s)	-0.08	0.10	-0.07	-0.07
Departure Headway (s)	4.4	4.6	4.5	4.7
Degree Utilization, x	0.21	0.14	0.18	0.05
Capacity (veh/h)	784	732	750	711
Control Delay (s)	8.6	8.4	8.5	7.9
Approach Delay (s)	8.6	8.4	8.5	7.9
Approach LOS	A	A	A	A

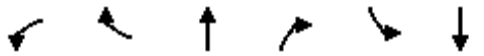
Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	38.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	22	153	13	70	66	50	13	118	158	95	25	5
Future Volume (vph)	22	153	13	70	66	50	13	118	158	95	25	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	166	14	76	72	54	14	128	172	103	27	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	204	202	314	135
Volume Left (vph)	24	76	14	103
Volume Right (vph)	14	54	172	5
Hadj (s)	0.02	-0.05	-0.29	0.16
Departure Headway (s)	5.5	5.4	5.0	5.7
Degree Utilization, x	0.31	0.30	0.43	0.21
Capacity (veh/h)	601	608	669	570
Control Delay (s)	10.9	10.7	11.8	10.2
Approach Delay (s)	10.9	10.7	11.8	10.2
Approach LOS	B	B	B	B

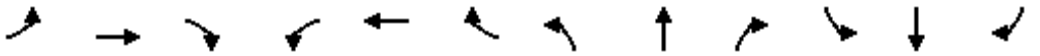
Intersection Summary				
Delay	11.1			
Level of Service	B			
Intersection Capacity Utilization	57.3%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	166	150	10	110	57
Future Volume (vph)	0	166	150	10	110	57
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	180	163	11	120	62

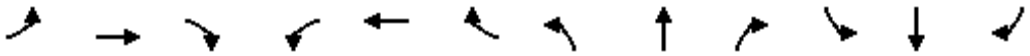
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	180	174	182
Volume Left (vph)	0	0	120
Volume Right (vph)	180	11	0
Hadj (s)	-0.57	0.00	0.17
Departure Headway (s)	4.2	4.5	4.7
Degree Utilization, x	0.21	0.22	0.24
Capacity (veh/h)	798	760	732
Control Delay (s)	8.3	8.8	9.1
Approach Delay (s)	8.3	8.8	9.1
Approach LOS	A	A	A

Intersection Summary			
Delay	8.7		
Level of Service	A		
Intersection Capacity Utilization	25.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	165	55	227	131	388	61	750	301	325	630	30
Future Volume (vph)	25	165	55	227	131	388	61	750	301	325	630	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1556		1805	1794	1770	3792		2006	3983	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1556		1805	1794	1770	3792		2006	3983	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	179	60	247	142	422	66	815	327	353	685	33
RTOR Reduction (vph)	0	0	53	0	0	171	0	35	0	0	3	0
Lane Group Flow (vph)	27	179	7	0	389	251	66	1107	0	353	715	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	13.5	13.5	13.5		26.7	48.4	7.7	36.0		21.7	50.0	
Effective Green, g (s)	13.5	13.5	13.5		26.7	48.4	7.7	36.0		21.7	50.0	
Actuated g/C Ratio	0.12	0.12	0.12		0.23	0.41	0.07	0.31		0.19	0.43	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	231	214	179		411	742	116	1166		372	1702	
v/s Ratio Prot	0.01	c0.10			c0.22	0.14	0.04	c0.29		c0.18	0.18	
v/s Ratio Perm			0.00									
v/c Ratio	0.12	0.84	0.04		0.95	0.34	0.57	0.95		0.95	0.42	
Uniform Delay, d1	46.4	50.7	46.0		44.4	23.4	53.0	39.6		47.1	23.4	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	22.8	0.0		30.7	0.3	3.8	16.7		33.2	0.8	
Delay (s)	46.5	73.5	46.0		75.2	23.7	56.8	56.3		80.3	24.1	
Level of Service	D	E	D		E	C	E	E		F	C	
Approach Delay (s)		64.5			48.4			56.3			42.7	
Approach LOS		E			D			E			D	

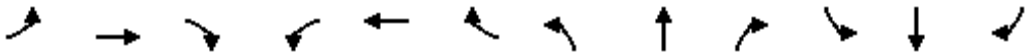
Intersection Summary			
HCM 2000 Control Delay	50.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	117.0	Sum of lost time (s)	19.1
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	718	32	43	690	81	21	0	43	38	14	85
Future Volume (Veh/h)	14	718	32	43	690	81	21	0	43	38	14	85
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	780	35	47	750	88	23	0	47	41	15	92
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	838			815			1815	1760	798	1762	1733	794
vC1, stage 1 conf vol							828	828		888	888	
vC2, stage 2 conf vol							988	932		874	845	
vCu, unblocked vol	838			747			1846	1785	727	1789	1756	794
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			94			86	100	88	79	94	76
cM capacity (veh/h)	796			783			164	240	385	194	236	388

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	830	885	70	148
Volume Left	15	47	23	41
Volume Right	35	88	47	92
cSH	796	783	267	289
Volume to Capacity	0.02	0.06	0.26	0.51
Queue Length 95th (ft)	1	5	26	68
Control Delay (s)	0.5	1.6	23.2	29.9
Lane LOS	A	A	C	D
Approach Delay (s)	0.5	1.6	23.2	29.9
Approach LOS			C	D

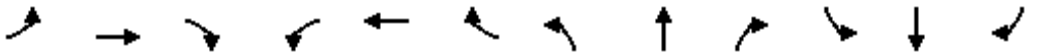
Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	81.4%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	976	25	61	960	97	5	4	97	38	4	23
Future Volume (Veh/h)	15	976	25	61	960	97	5	4	97	38	4	23
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	1061	27	66	1043	105	5	4	105	41	4	25
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.93			0.93	0.93	0.93	0.93	0.93	
vC, conflicting volume	1148			1089			2310	2388	1076	2428	2348	1096
vC1, stage 1 conf vol							1108	1108		1228	1228	
vC2, stage 2 conf vol							1203	1280		1200	1121	
vCu, unblocked vol	1148			1056			2376	2459	1041	2502	2417	1096
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			89			96	97	59	23	97	90
cM capacity (veh/h)	609			610			129	153	258	53	144	259

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	16	1088	66	1148	114	70
Volume Left	16	0	66	0	5	41
Volume Right	0	27	0	105	105	25
cSH	609	1700	610	1700	242	78
Volume to Capacity	0.03	0.64	0.11	0.68	0.47	0.90
Queue Length 95th (ft)	2	0	9	0	58	116
Control Delay (s)	11.1	0.0	11.6	0.0	32.5	165.8
Lane LOS	B		B		D	F
Approach Delay (s)	0.2		0.6		32.5	165.8
Approach LOS					D	F

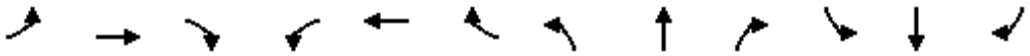
Intersection Summary				
Average Delay	6.5			
Intersection Capacity Utilization	73.5%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	1125	0	0	1158	370	0	0	0	0	0	25
Future Volume (Veh/h)	14	1125	0	0	1158	370	0	0	0	0	0	25
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	1223	0	0	1259	402	0	0	0	0	0	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1661			1223			2539	2914	1223	2713	2713	1460
vC1, stage 1 conf vol							1253	1253		1460	1460	
vC2, stage 2 conf vol							1286	1661		1253	1253	
vCu, unblocked vol	1661			1223			2539	2914	1223	2713	2713	1460
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	100	100	83
cM capacity (veh/h)	387			570			117	115	219	120	144	158

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	15	1223	0	1661	0	27
Volume Left	15	0	0	0	0	0
Volume Right	0	0	0	402	0	27
cSH	387	1700	1700	1700	1700	158
Volume to Capacity	0.04	0.72	0.00	0.98	0.00	0.17
Queue Length 95th (ft)	3	0	0	0	0	15
Control Delay (s)	14.7	0.0	0.0	0.0	0.0	32.3
Lane LOS	B				A	D
Approach Delay (s)	0.2		0.0		0.0	32.3
Approach LOS					A	D

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	93.5%	ICU Level of Service	F	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	101	0	0	101	106	839	22	101	673	10
Future Volume (Veh/h)	0	0	101	0	0	101	106	839	22	101	673	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	110	0	0	110	115	912	24	110	732	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1754	2124	738	2216	2117	468	743			936		
vC1, stage 1 conf vol	958	958		1154	1154							
vC2, stage 2 conf vol	796	1166		1062	963							
vCu, unblocked vol	1754	2124	738	2216	2117	468	743			936		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	69	100	100	80	87			85		
cM capacity (veh/h)	114	111	361	25	136	542	860			727		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	110	110	115	608	328	110	743
Volume Left	0	0	115	0	0	110	0
Volume Right	110	110	0	0	24	0	11
cSH	361	542	860	1700	1700	727	1700
Volume to Capacity	0.31	0.20	0.13	0.36	0.19	0.15	0.44
Queue Length 95th (ft)	32	19	12	0	0	13	0
Control Delay (s)	19.3	13.3	9.8	0.0	0.0	10.8	0.0
Lane LOS	C	B	A			B	
Approach Delay (s)	19.3	13.3	1.1			1.4	
Approach LOS	C	B					

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	48.9%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	199	91	83	0	52	12	25	0	27	547	44	0	19	547	50
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	221	101	92	0	58	13	28	0	30	606	49	0	21	606	55
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		414			99			685			682	
Entry Volume veh/h		406			97			672			669	
Circulating Flow (v_c), pc/h		685			857			343			101	
Exiting Flow (v_{ex}), pc/h		171			98			855			756	
Capacity (c_{pce}), pc/h		570			480			802			1021	
Capacity (c), veh/h		558			470			786			1001	
v/c Ratio (x)		0.73			0.21			0.85			0.67	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		25.3			10.7			29.3			13.8	
Lane LOS		D			B			D			B	
95% Queue, veh		6.1			0.8			10.2			5.3	
Approach Delay, s/veh	25.3			10.7			29.3			13.8		
Approach LOS	D			B			D			B		
Intersection Delay, s/veh | LOS	21.8						C					

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HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - West
E/W Street Name	West Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	34	20	15	0	28	20	63	0	15	189	28	0	63	189	34
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	38	22	17	0	31	22	70	0	17	210	31	0	70	210	38
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		77			123			258			318	
Entry Volume veh/h		75			121			253			312	
Circulating Flow (v_c), pc/h	311			265			130			70		
Exiting Flow (v_{ex}), pc/h	123			77			318			258		
Capacity (c_{pce}), pc/h		828			867			992			1054	
Capacity (c), veh/h		812			850			973			1033	
v/c Ratio (x)		0.09			0.14			0.26			0.30	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.4			5.6			6.3			6.5	
Lane LOS		A			A			A			A	
95% Queue, veh		0.3			0.5			1.0			1.3	
Approach Delay, s/veh	5.4			5.6			6.3			6.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.2						A					

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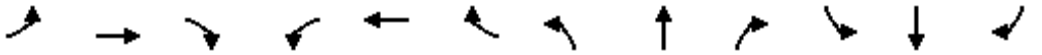
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	19	41	49	21	32	49	26	154	21	41	130	50
Future Volume (Veh/h)	19	41	49	21	32	49	26	154	21	41	130	50
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	45	53	23	35	53	28	167	23	45	141	54
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								737			527	
pX, platoon unblocked												
vC, conflicting volume	468	504	98	470	520	95	195			190		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	468	504	98	470	520	95	195			190		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	90	94	94	92	94	98			97		
cM capacity (veh/h)	407	444	940	398	435	943	1375			1381		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	119	111	112	106	116	124
Volume Left	21	23	28	0	45	0
Volume Right	53	53	0	23	0	54
cSH	569	571	1375	1700	1381	1700
Volume to Capacity	0.21	0.19	0.02	0.06	0.03	0.07
Queue Length 95th (ft)	20	18	2	0	3	0
Control Delay (s)	13.0	12.8	2.0	0.0	3.2	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	13.0	12.8	1.0		1.5	
Approach LOS	B	B				

Intersection Summary					
Average Delay	5.2				
Intersection Capacity Utilization	Err%	ICU Level of Service		H	
Analysis Period (min)	15				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	101	0	14	13	1058	13	24	2210	16
Future Volume (veh/h)	0	0	0	101	0	14	13	1058	13	24	2210	16
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				110	0	0	14	1150	0	26	2402	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				738	0	329	92	3173	988	92	2208	988
Arrive On Green				0.20	0.00	0.00	0.05	0.60	0.00	0.05	0.60	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				110	0	0	14	1150	0	26	2402	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Cycle Q Clear(g_c), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				738	0	329	92	3173	988	92	2208	988
V/C Ratio(X)				0.15	0.00	0.00	0.15	0.36	0.00	0.28	1.09	0.00
Avail Cap(c_a), veh/h				738	0	329	92	3173	988	92	2208	988
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				26.4	0.0	0.0	36.4	8.2	0.0	36.6	16.0	0.0
Incr Delay (d2), s/veh				0.4	0.0	0.0	3.5	0.3	0.0	7.5	47.8	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.0	0.0	0.0	0.4	4.4	0.0	0.7	38.6	0.0
LnGrp Delay(d),s/veh				26.8	0.0	0.0	39.8	8.5	0.0	44.1	63.8	0.0
LnGrp LOS				C			D	A		D	F	
Approach Vol, veh/h					110			1164			2428	
Approach Delay, s/veh					26.8			8.9			63.6	
Approach LOS					C			A			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	52.0			8.0	52.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	48.0			4.0	48.0		16.0
Max Q Clear Time (g_c+I1), s	3.1	10.9			2.6	50.0		4.0
Green Ext Time (p_c), s	0.0	10.6			0.0	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	45.3
HCM 2010 LOS	D

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1120	213	300	1284	0	0
Future Volume (veh/h)	1120	213	300	1284	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	1217	232	326	1396		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	2116	947	805	3313		
Arrive On Green	0.57	0.57	0.22	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	1217	232	326	1396		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	8.4	2.8	3.1	2.4		
Cycle Q Clear(g_c), s	8.4	2.8	3.1	2.4		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2116	947	805	3313		
V/C Ratio(X)	0.58	0.25	0.40	0.42		
Avail Cap(c_a), veh/h	2116	947	805	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.4	4.2	13.2	0.3		
Incr Delay (d2), s/veh	1.1	0.6	1.5	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.4	1.4	1.7	1.2		
LnGrp Delay(d),s/veh	6.5	4.8	14.7	0.7		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1449			1722		
Approach Delay, s/veh	6.3			3.4		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			13.0	27.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			9.0	23.0				36.0
Max Q Clear Time (g_c+I1), s			5.1	10.4				4.4
Green Ext Time (p_c), s			0.4	7.5				13.7

Intersection Summary	
HCM 2010 Ctrl Delay	4.7
HCM 2010 LOS	A



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1502	96	282	1143	154	0
Future Volume (veh/h)	1502	96	282	1143	154	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1633	104	307	1242	167	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1595	714	298	2147	523	467
Arrive On Green	0.43	0.43	0.08	0.58	0.28	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	1633	104	307	1242	167	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	26.0	2.3	5.0	12.7	4.3	0.0
Cycle Q Clear(g_c), s	26.0	2.3	5.0	12.7	4.3	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1595	714	298	2147	523	467
V/C Ratio(X)	1.02	0.15	1.03	0.58	0.32	0.00
Avail Cap(c_a), veh/h	1595	714	298	2147	523	467
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.0	10.3	27.5	7.9	16.9	0.0
Incr Delay (d2), s/veh	28.8	0.4	59.9	1.1	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	19.4	1.1	4.9	6.7	2.4	0.0
LnGrp Delay(d),s/veh	45.8	10.7	87.4	9.0	18.5	0.0
LnGrp LOS	F	B	F	A	B	
Approach Vol, veh/h	1737			1549	167	
Approach Delay, s/veh	43.7			24.5	18.5	
Approach LOS	D			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		21.0	9.0	30.0				39.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		17.0	5.0	26.0				35.0
Max Q Clear Time (g_c+I1), s		6.3	7.0	28.0				14.7
Green Ext Time (p_c), s		0.3	0.0	0.0				9.5

Intersection Summary	
HCM 2010 Ctrl Delay	33.9
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	641	6	83	596	97	5	0	32	70	8	47
Future Volume (veh/h)	0	641	6	83	596	97	5	0	32	70	8	47
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	697	7	90	648	0	5	0	35	82	0	51
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1245	12	217	1949	872	0	0	0	1158	0	517
Arrive On Green	0.00	0.33	0.33	0.12	0.53	0.00	0.00	0.00	0.00	0.31	0.00	0.31
Sat Flow, veh/h	0	3830	37	1845	3681	1647		0		3690	0	1647
Grp Volume(v), veh/h	0	344	360	90	648	0		0.0		82	0	51
Grp Sat Flow(s),veh/h/ln	0	1840	1931	1845	1840	1647				1845	0	1647
Q Serve(g_s), s	0.0	7.8	7.8	2.3	5.1	0.0				0.8	0.0	1.1
Cycle Q Clear(g_c), s	0.0	7.8	7.8	2.3	5.1	0.0				0.8	0.0	1.1
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	613	644	217	1949	872				1158	0	517
V/C Ratio(X)	0.00	0.56	0.56	0.41	0.33	0.00				0.07	0.00	0.10
Avail Cap(c_a), veh/h	0	613	644	217	1949	872				1158	0	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.9	13.9	20.9	6.9	0.0				12.3	0.0	12.4
Incr Delay (d2), s/veh	0.0	3.7	3.5	5.7	0.5	0.0				0.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.5	4.7	1.5	2.6	0.0				0.4	0.0	0.6
LnGrp Delay(d),s/veh	0.0	17.6	17.4	26.6	7.3	0.0				12.4	0.0	12.8
LnGrp LOS		B	B	C	A					B		B
Approach Vol, veh/h		704			738						133	
Approach Delay, s/veh		17.5			9.7						12.5	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			10.0	21.0		20.0		31.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			6.0	17.0		16.0		27.0
Max Q Clear Time (g_c+I1), s			4.3	9.8		3.1		7.1
Green Ext Time (p_c), s			0.0	2.5		0.3		4.4

Intersection Summary	
HCM 2010 Ctrl Delay	13.4
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	183	742	10	28	1089	279	9	2	15	273	6	75
Future Volume (veh/h)	183	742	10	28	1089	279	9	2	15	273	6	75
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	199	807	11	30	1184	303	10	2	16	193	153	82
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	1255	17	115	1104	494	310	62	329	369	238	127
Arrive On Green	0.10	0.34	0.34	0.06	0.30	0.30	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1845	3718	51	1845	3681	1647	1550	310	1647	1845	1188	637
Grp Volume(v), veh/h	199	399	419	30	1184	303	12	0	16	193	0	235
Grp Sat Flow(s),veh/h/ln	1845	1840	1928	1845	1840	1647	1860	0	1647	1845	0	1825
Q Serve(g_s), s	8.0	14.7	14.7	1.2	24.0	12.6	0.4	0.0	0.6	7.5	0.0	9.5
Cycle Q Clear(g_c), s	8.0	14.7	14.7	1.2	24.0	12.6	0.4	0.0	0.6	7.5	0.0	9.5
Prop In Lane	1.00		0.03	1.00		1.00	0.83		1.00	1.00		0.35
Lane Grp Cap(c), veh/h	185	621	651	115	1104	494	372	0	329	369	0	365
V/C Ratio(X)	1.08	0.64	0.64	0.26	1.07	0.61	0.03	0.00	0.05	0.52	0.00	0.64
Avail Cap(c_a), veh/h	185	621	651	115	1104	494	372	0	329	369	0	365
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	22.4	22.4	35.7	28.0	24.0	25.8	0.0	25.9	28.6	0.0	29.4
Incr Delay (d2), s/veh	88.7	5.1	4.8	5.4	48.7	5.6	0.2	0.0	0.3	5.2	0.0	8.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.6	8.3	8.7	0.8	19.6	6.5	0.2	0.0	0.3	4.3	0.0	5.6
LnGrp Delay(d),s/veh	124.7	27.5	27.3	41.1	76.7	29.6	25.9	0.0	26.1	33.8	0.0	37.9
LnGrp LOS	F	C	C	D	F	C	C		C	C		D
Approach Vol, veh/h		1017			1517			28			428	
Approach Delay, s/veh		46.4			66.6			26.0			36.0	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	31.0		20.0	12.0	28.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	27.0		16.0	8.0	24.0
Max Q Clear Time (g_c+I1), s		2.6	3.2	16.7		11.5	10.0	26.0
Green Ext Time (p_c), s		0.0	0.0	3.7		0.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	55.0
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	908	285	88	800	174	363	97	141	410	236	381
Future Volume (veh/h)	59	908	285	88	800	174	363	97	141	410	236	381
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	64	987	310	96	870	189	250	308	153	352	389	414
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	115	898	280	92	1150	515	415	436	370	369	387	329
Arrive On Green	0.06	0.32	0.32	0.05	0.31	0.31	0.22	0.22	0.22	0.20	0.20	0.20
Sat Flow, veh/h	1845	2763	863	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	64	656	641	96	870	189	250	308	153	352	389	414
Grp Sat Flow(s),veh/h/ln	1845	1840	1785	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.7	26.0	26.0	4.0	17.0	7.1	9.7	11.7	6.4	15.1	16.0	16.0
Cycle Q Clear(g_c), s	2.7	26.0	26.0	4.0	17.0	7.1	9.7	11.7	6.4	15.1	16.0	16.0
Prop In Lane	1.00		0.48	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	115	598	580	92	1150	515	415	436	371	369	387	329
V/C Ratio(X)	0.56	1.10	1.11	1.04	0.76	0.37	0.60	0.71	0.41	0.95	1.00	1.26
Avail Cap(c_a), veh/h	115	598	580	92	1150	515	415	436	371	369	387	329
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.4	27.0	27.0	38.0	24.8	21.4	27.8	28.6	26.5	31.6	32.0	32.0
Incr Delay (d2), s/veh	17.9	65.8	69.7	105.2	4.7	2.0	6.3	9.3	3.4	36.6	46.7	138.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	24.1	24.0	4.7	9.3	3.5	5.7	7.4	3.2	11.4	13.5	19.9
LnGrp Delay(d),s/veh	54.3	92.8	96.7	143.9	29.4	23.4	34.1	37.9	29.9	68.2	78.7	170.1
LnGrp LOS	D	F	F	F	C	C	C	D	C	E	F	F
Approach Vol, veh/h		1361			1155			711			1155	
Approach Delay, s/veh		92.8			37.9			34.8			108.3	
Approach LOS		F			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.0	8.0	30.0		20.0	9.0	29.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	4.0	26.0		16.0	5.0	25.0
Max Q Clear Time (g_c+I1), s		13.7	6.0	28.0		18.0	4.7	19.0
Green Ext Time (p_c), s		1.3	0.0	0.0		0.0	0.0	3.2

Intersection Summary	
HCM 2010 Ctrl Delay	73.0
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	81	6	6	88	9	4	2	7	0	0	0
Future Vol, veh/h	24	81	6	6	88	9	4	2	7	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	88	7	7	96	10	4	2	8	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	7.6	7.2
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	31%	22%	6%
Vol Thru, %	15%	73%	85%
Vol Right, %	54%	5%	9%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	13	111	103
LT Vol	4	24	6
Through Vol	2	81	88
RT Vol	7	6	9
Lane Flow Rate	14	121	112
Geometry Grp	1	1	1
Degree of Util (X)	0.016	0.136	0.125
Departure Headway (Hd)	4.17	4.054	4.009
Convergence, Y/N	Yes	Yes	Yes
Cap	864	884	893
Service Time	2.17	2.081	2.039
HCM Lane V/C Ratio	0.016	0.137	0.125
HCM Control Delay	7.2	7.7	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.5	0.4

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	176	53	27	32	0	0	0	0	26	0	45
Future Vol, veh/h	0	176	53	27	32	0	0	0	0	26	0	45
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	191	58	29	35	0	0	0	0	28	0	49

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	191	0	0			284	284	35
Stage 1	-	-	-	-	-	-			93	93	-
Stage 2	-	-	-	-	-	-			191	191	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1383	-	0			706	625	1038
Stage 1	0	-	-	-	-	0			931	818	-
Stage 2	0	-	-	-	-	0			841	742	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1383	-	-			691	0	1038
Mov Cap-2 Maneuver	-	-	-	-	-	-			691	0	-
Stage 1	-	-	-	-	-	-			911	0	-
Stage 2	-	-	-	-	-	-			841	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	3.5	9.3
HCM LOS			A

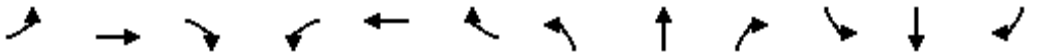
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1383	-	691	1038
HCM Lane V/C Ratio	-	-	0.021	-	0.041	0.047
HCM Control Delay (s)	-	-	7.7	0	10.4	8.6
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	717	99	165	1237	40	252
Future Volume (veh/h)	717	99	165	1237	40	252
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	779	0	179	1345	43	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1963	878	334	1317	394	618
Arrive On Green	0.53	0.00	0.09	0.68	0.21	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	779	0	179	1345	43	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	9.4	0.0	3.6	51.0	1.4	0.0
Cycle Q Clear(g_c), s	9.4	0.0	3.6	51.0	1.4	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1963	878	334	1317	394	618
V/C Ratio(X)	0.40	0.00	0.54	1.02	0.11	0.00
Avail Cap(c_a), veh/h	1963	878	334	1317	394	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	10.4	0.0	32.4	12.0	23.8	0.0
Incr Delay (d2), s/veh	0.6	0.0	6.0	30.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	0.0	2.0	37.4	0.8	0.0
LnGrp Delay(d),s/veh	11.0	0.0	38.5	42.2	24.3	0.0
LnGrp LOS	B		D	F	C	
Approach Vol, veh/h	779			1524	43	
Approach Delay, s/veh	11.0			41.8	24.3	
Approach LOS	B			D	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	11.0	44.0				55.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	7.0	40.0				51.0
Max Q Clear Time (g_c+I1), s		3.4	5.6	11.4				53.0
Green Ext Time (p_c), s		0.0	0.1	6.1				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	31.2
HCM 2010 LOS	C

Appendix M.2 – Analysis Output Sheets (Future with Project Alternative 3 Existing SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	89	81	61	94	300	568	169	18	141	83	23	69
Future Volume (vph)	89	81	61	94	300	568	169	18	141	83	23	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.93	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3143	1441		1782	1583		1793	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3143	1441		1782	1583		1793	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	97	88	66	102	326	617	184	20	153	90	25	75
RTOR Reduction (vph)	0	0	58	0	228	254	0	0	91	0	0	57
Lane Group Flow (vph)	97	88	8	102	407	54	0	204	62	0	115	18
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Effective Green, g (s)	5.5	8.4	8.4	8.3	12.8	12.8		21.4	21.4		17.2	17.2
Actuated g/C Ratio	0.07	0.11	0.11	0.11	0.17	0.17		0.29	0.29		0.23	0.23
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	132	212	180	199	546	250		518	460		419	369
v/s Ratio Prot	0.05	0.05		c0.06	c0.13			c0.11			c0.06	
v/s Ratio Perm			0.00			0.04			0.04			0.01
v/c Ratio	0.73	0.42	0.04	0.51	0.75	0.21		0.39	0.13		0.27	0.05
Uniform Delay, d1	33.3	30.3	29.0	30.7	28.9	26.1		20.9	19.3		23.1	21.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	19.0	0.5	0.0	2.2	4.8	0.2		2.2	0.6		1.6	0.2
Delay (s)	52.3	30.8	29.1	33.0	33.7	26.2		23.1	19.9		24.7	22.1
Level of Service	D	C	C	C	C	C		C	B		C	C
Approach Delay (s)		38.7			31.4			21.7			23.7	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	29.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	18.3
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	415	0	377	0	0	177	471	0	120	164	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	0	0	0	0	460	0	410	0	0	196	522	0	133	182	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929		4.6453	4.3276			4.3276		4.6453	4.3276	
Follow-Up Headway (s)		3.1858		2.6667	2.5352			2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		0		0	460	410		196	522	133	182	
Entry Volume veh/h		0		0	451	410		192	512	130	178	
Circulating Flow (v_c), pc/h	775			196			133			460		
Exiting Flow (v_{ex}), pc/h	133			0			196			642		
Capacity (c_{pce}), pc/h		521		1127	1202			1268		884	960	
Capacity (c), veh/h		510		1105	1179			1243		867	942	
v/c Ratio (x)		0.00		0.00	0.38			0.15		0.15	0.19	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.1		3.3	6.8	0.0		4.2	0.0	5.6	5.7	
Lane LOS		A		A	A	A		A	A	A	A	
95% Queue, veh		0.0		0.0	1.8			0.5		0.5	0.7	
Approach Delay, s/veh				3.6			1.1			5.7		
Approach LOS				A			A			A		
Intersection Delay, s/veh | LOS	3.0						A					

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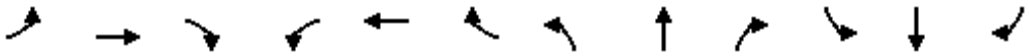
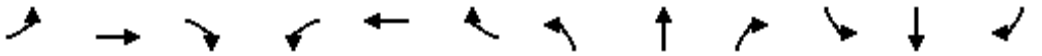


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	22	4	43	28	85	12	58	63	127	79	6
Future Volume (vph)	2	22	4	43	28	85	12	58	63	127	79	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	24	4	47	30	92	13	63	68	138	86	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	30	169	144	231
Volume Left (vph)	2	47	13	138
Volume Right (vph)	4	92	68	7
Hadj (s)	-0.03	-0.24	-0.23	0.14
Departure Headway (s)	5.0	4.6	4.4	4.7
Degree Utilization, x	0.04	0.22	0.18	0.30
Capacity (veh/h)	648	724	764	730
Control Delay (s)	8.2	8.8	8.4	9.7
Approach Delay (s)	8.2	8.8	8.4	9.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.0			
Level of Service	A			
Intersection Capacity Utilization	44.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	174	15	48	8	29	55	45	295	17	22	404	99
Future Volume (vph)	174	15	48	8	29	55	45	295	17	22	404	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.92		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1781	1583		1706		1770	1848		1770	1863	1583
Flt Permitted		0.73	1.00		0.98		0.43	1.00		0.53	1.00	1.00
Satd. Flow (perm)		1368	1583		1674		803	1848		987	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	189	16	52	9	32	60	49	321	18	24	439	108
RTOR Reduction (vph)	0	0	35	0	41	0	0	3	0	0	0	46
Lane Group Flow (vph)	0	205	17	0	60	0	49	336	0	24	439	62
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		17.5	17.5		17.5		30.3	30.3		31.5	31.5	31.5
Effective Green, g (s)		17.5	17.5		17.5		30.3	30.3		31.5	31.5	31.5
Actuated g/C Ratio		0.32	0.32		0.32		0.55	0.55		0.57	0.57	0.57
Clearance Time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		7.0	7.0	7.0
Lane Grp Cap (vph)		435	503		532		442	1018		565	1066	906
v/s Ratio Prot								0.18			c0.24	
v/s Ratio Perm		c0.15	0.01		0.04		0.06			0.02		0.04
v/c Ratio		0.47	0.03		0.11		0.11	0.33		0.04	0.41	0.07
Uniform Delay, d1		15.0	12.9		13.3		5.9	6.8		5.1	6.6	5.2
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		2.8	0.1		0.3		0.5	0.9		0.1	1.2	0.1
Delay (s)		17.9	13.0		13.6		6.4	7.6		5.3	7.7	5.4
Level of Service		B	B		B		A	A		A	A	A
Approach Delay (s)		16.9			13.6			7.5			7.2	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Civic Center Drive
Agency or Co.	IBI Group	E/W Street Name	Civic Center Drive
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	11	7	7	0	15	10	13	0	6	293	18	0	39	349	11
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	12	8	8	0	17	11	14	0	7	325	20	0	43	387	12
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		28			42			352			442	
Entry Volume veh/h		27			41			345			433	
Circulating Flow (v_c), pc/h	447			344			63			35		
Exiting Flow (v_{ex}), pc/h	71			30			351			412		
Capacity (c_{pce}), pc/h		723			801			1061			1091	
Capacity (c), veh/h		709			785			1040			1070	
v/c Ratio (x)		0.04			0.05			0.33			0.41	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.5			5.1			6.8			7.7	
Lane LOS		A			A			A			A	
95% Queue, veh		0.1			0.2			1.5			2.0	
Approach Delay, s/veh	5.5			5.1			6.8			7.7		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.1						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Highway - Pier View Way
Agency or Co.	IBI Group	E/W Street Name	Pier View Way
Date Performed	7/11/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	16	12	23	0	2	18	3	0	18	331	2	0	2	360	47
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	18	13	26	0	2	20	3	0	20	367	2	0	2	399	52
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		57			25			389			453	
Entry Volume veh/h		56			25			381			444	
Circulating Flow (v_c), pc/h	403			405			33			42		
Exiting Flow (v_{ex}), pc/h	17			92			388			427		
Capacity (c_{pce}), pc/h		755			754			1093			1084	
Capacity (c), veh/h		740			739			1072			1062	
v/c Ratio (x)		0.08			0.03			0.36			0.42	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.6			5.2			7.0			7.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.2			0.1			1.6			2.1	
Approach Delay, s/veh	5.6			5.2			7.0			7.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.3						A					

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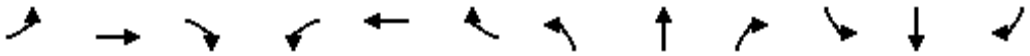


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	3	4	26	10	8	4	121	219	4	6	150	9
Future Volume (vph)	3	4	26	10	8	4	121	219	4	6	150	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	4	28	11	9	4	132	238	4	7	163	10

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	7	28	24	251	123	89	92
Volume Left (vph)	3	0	11	132	0	7	0
Volume Right (vph)	0	28	4	0	4	0	10
Hadj (s)	0.25	-0.67	0.03	0.30	0.01	0.07	-0.04
Departure Headway (s)	6.0	5.1	5.8	5.1	4.8	5.1	4.9
Degree Utilization, x	0.01	0.04	0.04	0.36	0.16	0.12	0.13
Capacity (veh/h)	548	640	572	692	729	687	706
Control Delay (s)	7.9	7.1	9.0	9.7	7.6	7.6	7.5
Approach Delay (s)	7.3		9.0	9.0		7.5	
Approach LOS	A		A	A		A	

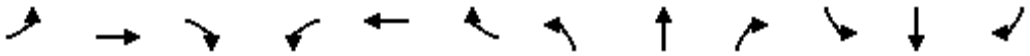
Intersection Summary				
Delay	8.5			
Level of Service	A			
Intersection Capacity Utilization	32.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	131	58	129	92	34	113
Future Volume (vph)	131	58	129	92	34	113
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	142	63	140	100	37	123

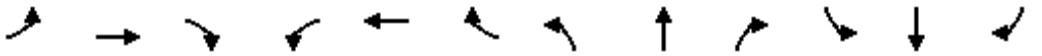
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	142	63	240	160
Volume Left (vph)	142	0	0	37
Volume Right (vph)	0	63	100	0
Hadj (s)	0.53	-0.67	-0.22	0.08
Departure Headway (s)	6.0	4.8	4.5	4.8
Degree Utilization, x	0.24	0.08	0.30	0.21
Capacity (veh/h)	567	705	774	705
Control Delay (s)	9.6	7.0	9.3	9.2
Approach Delay (s)	8.8		9.3	9.2
Approach LOS	A		A	A

Intersection Summary			
Delay	9.1		
Level of Service	A		
Intersection Capacity Utilization	37.5%	ICU Level of Service	A
Analysis Period (min)	15		



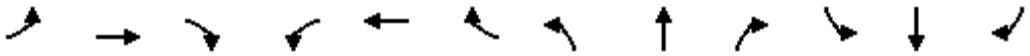
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	0	127	34	167	31	0	0	0	0	28	39
Future Volume (vph)	17	0	127	34	167	31	0	0	0	0	28	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.98						0.91	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3456						3230	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3456						3230	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	0	138	37	182	34	0	0	0	0	30	42
RTOR Reduction (vph)	0	0	129	15	14	0	0	0	0	0	39	0
Lane Group Flow (vph)	18	0	9	22	202	0	0	0	0	0	33	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	3.3		3.3	29.3	29.3						3.9	
Effective Green, g (s)	3.3		3.3	29.3	29.3						3.9	
Actuated g/C Ratio	0.07		0.07	0.59	0.59						0.08	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	116		183	1037	2025						251	
v/s Ratio Prot	c0.01		0.00	0.01	c0.06						c0.01	
v/s Ratio Perm												
v/c Ratio	0.16		0.05	0.02	0.10						0.13	
Uniform Delay, d1	22.0		21.9	4.3	4.6						21.5	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	0.6		0.1	0.0	0.1						0.2	
Delay (s)	22.7		22.0	4.4	4.6						21.7	
Level of Service	C		C	A	A						C	
Approach Delay (s)		22.1			4.6			0.0			21.7	
Approach LOS		C			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.11		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	23.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	126	206	65	66	497	0	0	283	30
Future Volume (vph)	0	0	0	126	206	65	66	497	0	0	283	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1526	1770	1863			1767	1461
Flt Permitted				0.95	1.00	1.00	0.44	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1526	813	1863			1767	1461
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	137	224	71	72	540	0	0	308	33
RTOR Reduction (vph)	0	0	0	0	0	49	0	0	0	0	1	22
Lane Group Flow (vph)	0	0	0	137	224	22	72	540	0	0	310	8
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.1	18.1	18.1	30.6	30.6			15.5	15.5
Effective Green, g (s)				18.1	18.1	18.1	30.6	30.6			15.5	15.5
Actuated g/C Ratio				0.31	0.31	0.31	0.52	0.52			0.26	0.26
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				545	1091	470	588	971			466	385
v/s Ratio Prot				c0.08	0.06		0.02	c0.29			c0.18	
v/s Ratio Perm						0.01	0.04					0.01
v/c Ratio				0.25	0.21	0.05	0.12	0.56			0.67	0.02
Uniform Delay, d1				15.2	15.0	14.2	9.8	9.5			19.3	16.0
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				1.1	0.4	0.2	0.1	0.9			3.9	0.0
Delay (s)				16.3	15.4	14.4	9.9	10.3			23.2	16.0
Level of Service				B	B	B	A	B			C	B
Approach Delay (s)		0.0			15.5			10.3			22.6	
Approach LOS		A			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	14.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	58.7	Sum of lost time (s)	15.0
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	116	1	132	434	214	11	26	200	144	50	6
Future Volume (vph)	24	116	1	132	434	214	11	26	200	144	50	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.98	
Satd. Flow (prot)	1770	3535		1770	3539	1583		1835	1583	1681	1714	
Flt Permitted	0.44	1.00		0.67	1.00	1.00		0.94	1.00	0.73	0.89	
Satd. Flow (perm)	815	3535		1251	3539	1583		1754	1583	1294	1561	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	126	1	143	472	233	12	28	217	157	54	7
RTOR Reduction (vph)	0	1	0	0	0	169	0	0	97	0	3	0
Lane Group Flow (vph)	26	126	0	143	472	64	0	40	120	107	108	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	15.4	15.4		15.0	15.0	15.0		30.4	30.4	30.4	30.4	
Effective Green, g (s)	15.4	15.4		15.0	15.0	15.0		30.4	30.4	30.4	30.4	
Actuated g/C Ratio	0.28	0.28		0.27	0.27	0.27		0.55	0.55	0.55	0.55	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	228	989		341	965	431		969	874	715	862	
v/s Ratio Prot		0.04			c0.13							
v/s Ratio Perm	0.03			0.11		0.04		0.02	0.08	c0.08	0.07	
v/c Ratio	0.11	0.13		0.42	0.49	0.15		0.04	0.14	0.15	0.13	
Uniform Delay, d1	14.7	14.8		16.4	16.8	15.2		5.6	6.0	6.0	5.9	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.1		1.0	0.5	0.2		0.1	0.3	0.4	0.3	
Delay (s)	15.0	14.9		17.4	17.2	15.3		5.7	6.3	6.4	6.2	
Level of Service	B	B		B	B	B		A	A	A	A	
Approach Delay (s)		14.9			16.8			6.2			6.3	
Approach LOS		B			B			A			A	

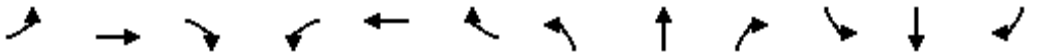
Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	79	5	20	28	5	8
Future Volume (Veh/h)	79	5	20	28	5	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	5	22	30	5	9
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			91		162	88
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			91		162	88
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		99	99
cM capacity (veh/h)			1504		816	970

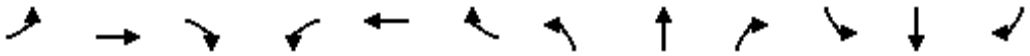
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	91	52	14
Volume Left	0	22	5
Volume Right	5	0	9
cSH	1700	1504	909
Volume to Capacity	0.05	0.01	0.02
Queue Length 95th (ft)	0	1	1
Control Delay (s)	0.0	3.2	9.0
Lane LOS		A	A
Approach Delay (s)	0.0	3.2	9.0
Approach LOS			A

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	19.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	50	85	0	0	0	24	217	60	70	210	47
Future Volume (vph)	80	50	85	0	0	0	24	217	60	70	210	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.95				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1498				1770	1863	1552	1770	1863	1518
Flt Permitted	0.95	1.00	1.00				0.62	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)	1770	1863	1498				1148	1863	1552	826	1863	1518
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	54	92	0	0	0	26	236	65	76	228	51
RTOR Reduction (vph)	0	0	51	0	0	0	0	0	47	0	0	31
Lane Group Flow (vph)	87	54	41	0	0	0	26	236	18	76	228	20
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	24.3	24.3	24.3				15.5	15.5	15.5	21.9	21.9	21.9
Effective Green, g (s)	24.3	24.3	24.3				15.5	15.5	15.5	21.9	21.9	21.9
Actuated g/C Ratio	0.44	0.44	0.44				0.28	0.28	0.28	0.40	0.40	0.40
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	782	823	661				323	525	437	370	741	604
v/s Ratio Prot	c0.05	0.03						c0.13		0.01	c0.12	
v/s Ratio Perm			0.03				0.02		0.01	0.07		0.01
v/c Ratio	0.11	0.07	0.06				0.08	0.45	0.04	0.21	0.31	0.03
Uniform Delay, d1	9.0	8.8	8.8				14.5	16.2	14.4	10.7	11.4	10.1
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.2	0.2				0.5	2.8	0.2	0.3	1.1	0.1
Delay (s)	9.3	9.0	9.0				15.0	19.0	14.5	11.0	12.4	10.2
Level of Service	A	A	A				B	B	B	B	B	B
Approach Delay (s)		9.1			0.0			17.8			11.8	
Approach LOS		A			A			B			B	

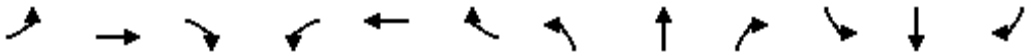
Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	49.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	198	10	0	0	0	0	4	17	18	7	0
Future Volume (Veh/h)	9	198	10	0	0	0	0	4	17	18	7	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	215	11	0	0	0	0	4	18	20	8	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			226			244	240	113	148	246	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			226			244	240	113	148	246	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	99	98	97	99	100
cM capacity (veh/h)	1622			1340			679	656	918	783	651	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	118	118	22	28
Volume Left	10	0	0	20
Volume Right	0	11	18	0
cSH	1622	1700	856	740
Volume to Capacity	0.01	0.07	0.03	0.04
Queue Length 95th (ft)	0	0	2	3
Control Delay (s)	0.7	0.0	9.3	10.1
Lane LOS	A		A	B
Approach Delay (s)	0.3		9.3	10.1
Approach LOS			A	B

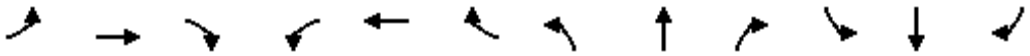
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	20.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	23	459	4	0	0	0	0	4	21	14	12	0
Future Volume (vph)	23	459	4	0	0	0	0	4	21	14	12	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	499	4	0	0	0	0	4	23	15	13	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	275	254	27	28
Volume Left (vph)	25	0	0	15
Volume Right (vph)	0	4	23	0
Hadj (s)	0.08	0.02	-0.48	0.14
Departure Headway (s)	4.7	4.7	4.6	5.2
Degree Utilization, x	0.36	0.33	0.03	0.04
Capacity (veh/h)	755	760	734	647
Control Delay (s)	9.2	8.7	7.7	8.4
Approach Delay (s)	9.0		7.7	8.4
Approach LOS	A		A	A

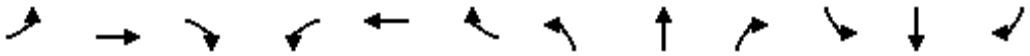
Intersection Summary				
Delay	8.9			
Level of Service	A			
Intersection Capacity Utilization	28.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	95	188	9	40	0	96	0	46	30	0	0	0
Future Volume (vph)	95	188	9	40	0	96	0	46	30	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	204	10	43	0	104	0	50	33	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	103	214	147	83
Volume Left (vph)	103	0	43	0
Volume Right (vph)	0	10	104	33
Hadj (s)	0.53	0.00	-0.33	-0.20
Departure Headway (s)	5.4	4.8	4.2	4.7
Degree Utilization, x	0.15	0.29	0.17	0.11
Capacity (veh/h)	661	730	821	705
Control Delay (s)	8.1	8.5	8.1	8.3
Approach Delay (s)	8.4		8.1	8.3
Approach LOS	A		A	A

Intersection Summary				
Delay	8.3			
Level of Service	A			
Intersection Capacity Utilization	32.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	15	0	0	31	15	218	20	14	226	7
Future Volume (Veh/h)	0	0	15	0	0	31	15	218	20	14	226	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	16	0	0	34	16	237	22	15	246	8
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked												
vC, conflicting volume	590	585	257	579	578	255	261			266		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	590	585	257	579	578	255	261			266		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	98	100	100	96	99			99		
cM capacity (veh/h)	387	407	777	403	411	778	1296			1288		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	16	34	16	259	15	254
Volume Left	0	0	16	0	15	0
Volume Right	16	34	0	22	0	8
cSH	777	778	1296	1700	1288	1700
Volume to Capacity	0.02	0.04	0.01	0.15	0.01	0.15
Queue Length 95th (ft)	2	3	1	0	1	0
Control Delay (s)	9.7	9.8	7.8	0.0	7.8	0.0
Lane LOS	A	A	A		A	
Approach Delay (s)	9.7	9.8	0.5		0.4	
Approach LOS	A	A				

Intersection Summary				
Average Delay	1.2			
Intersection Capacity Utilization	22.9%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	13	2	22	0	37	6	4	0	16	213	11	0	3	222	16
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	14	2	24	0	41	7	4	0	18	236	12	0	3	246	18
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		40			52			266			267	
Entry Volume veh/h		39			51			261			262	
Circulating Flow (v_c), pc/h	290			268			19			66		
Exiting Flow (v_{ex}), pc/h	17			43			254			311		
Capacity (c_{pce}), pc/h		846			864			1109			1058	
Capacity (c), veh/h		829			847			1087			1037	
v/c Ratio (x)		0.05			0.06			0.24			0.25	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.8			4.8			5.6			5.9	
Lane LOS		A			A			A			A	
95% Queue, veh		0.1			0.2			0.9			1.0	
Approach Delay, s/veh	4.8			4.8			5.6			5.9		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.6						A					

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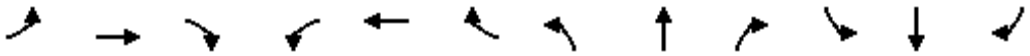
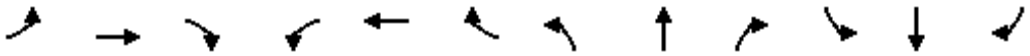


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	20	28	17	25	3	76	3	140	39	90	95	1
Future Volume (vph)	20	28	17	25	3	76	3	140	39	90	95	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	22	30	18	27	3	83	3	152	42	98	103	1

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	70	113	197	202
Volume Left (vph)	22	27	3	98
Volume Right (vph)	18	83	42	1
Hadj (s)	-0.06	-0.36	-0.09	0.13
Departure Headway (s)	4.9	4.6	4.5	4.7
Degree Utilization, x	0.10	0.14	0.25	0.26
Capacity (veh/h)	658	712	759	725
Control Delay (s)	8.5	8.4	9.0	9.4
Approach Delay (s)	8.5	8.4	9.0	9.4
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.9			
Level of Service	A			
Intersection Capacity Utilization	37.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	191	18	3	88	15	9	20	23	21	28	11
Future Volume (Veh/h)	8	191	18	3	88	15	9	20	23	21	28	11
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	208	20	3	96	16	10	22	25	23	30	12
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked												
vC, conflicting volume	126			235			381	375	225	396	377	119
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	126			235			381	375	225	396	377	119
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			98	96	97	96	94	99
cM capacity (veh/h)	1443			1325			531	542	810	513	540	921

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	237	115	57	65
Volume Left	9	3	10	23
Volume Right	20	16	25	12
cSH	1443	1325	631	573
Volume to Capacity	0.01	0.00	0.09	0.11
Queue Length 95th (ft)	0	0	7	10
Control Delay (s)	0.3	0.2	11.3	12.1
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.2	11.3	12.1
Approach LOS			B	B

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	27.8%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Wisconsin Avenue
E/W Street Name	Wisconsin Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	52	58	130	0	97	31	30	0	64	212	70	0	18	234	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	58	64	144	0	108	34	33	0	71	235	78	0	20	259	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		266			175			384			298	
Entry Volume veh/h		261			172			376			292	
Circulating Flow (v_c), pc/h		387			364			142			213	
Exiting Flow (v_{ex}), pc/h		162			124			326			511	
Capacity (c_{pce}), pc/h		767			785			980			913	
Capacity (c), veh/h		752			770			961			895	
v/c Ratio (x)		0.35			0.22			0.39			0.33	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.0			7.1			8.1			7.6	
Lane LOS		A			A			A			A	
95% Queue, veh		1.6			0.9			1.9			1.4	
Approach Delay, s/veh	9.0			7.1			8.1			7.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.0						A					

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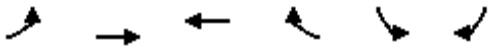
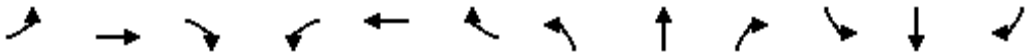


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	241	233	5	16	14
Future Volume (Veh/h)	8	241	233	5	16	14
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	262	253	5	17	15
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	266				544	264
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	266				544	264
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				97	98
cM capacity (veh/h)	1289				493	768

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	271	258	32
Volume Left	9	0	17
Volume Right	0	5	15
cSH	1289	1700	592
Volume to Capacity	0.01	0.15	0.05
Queue Length 95th (ft)	1	0	4
Control Delay (s)	0.3	0.0	11.4
Lane LOS	A		B
Approach Delay (s)	0.3	0.0	11.4
Approach LOS			B

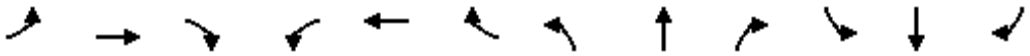
Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	29.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	227	10	21	214	13	6	5	14	40	1	6
Future Volume (Veh/h)	8	227	10	21	214	13	6	5	14	40	1	6
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	247	11	23	233	14	7	5	15	43	1	7
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	249			258			566	566	252	576	564	244
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	249			258			566	566	252	576	564	244
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			98	99	98	89	100	99
cM capacity (veh/h)	1314			1307			421	423	786	407	423	792

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	267	270	27	51
Volume Left	9	23	7	43
Volume Right	11	14	15	7
cSH	1314	1307	568	437
Volume to Capacity	0.01	0.02	0.05	0.12
Queue Length 95th (ft)	1	1	4	10
Control Delay (s)	0.3	0.8	11.7	14.3
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.8	11.7	14.3
Approach LOS			B	B

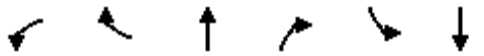
Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	35.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	119	199	73	151	0	107	0	37	0	0	0
Future Volume (vph)	0	119	199	73	151	0	107	0	37	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	129	216	79	164	0	116	0	40	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	345	243	156	0
Volume Left (vph)	0	79	116	0
Volume Right (vph)	216	0	40	0
Hadj (s)	-0.34	0.10	0.03	0.00
Departure Headway (s)	4.3	4.8	5.2	5.5
Degree Utilization, x	0.41	0.33	0.23	0.00
Capacity (veh/h)	808	712	615	565
Control Delay (s)	10.3	10.1	9.8	8.5
Approach Delay (s)	10.3	10.1	9.8	0.0
Approach LOS	B	B	A	A

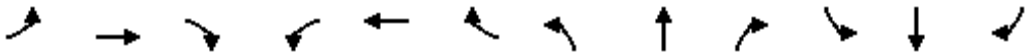
Intersection Summary			
Delay	10.1		
Level of Service	B		
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	49	69	89	31	80	107
Future Volume (vph)	49	69	89	31	80	107
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	53	75	97	34	87	116

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	128	131	203
Volume Left (vph)	53	0	87
Volume Right (vph)	75	34	0
Hadj (s)	-0.23	-0.12	0.12
Departure Headway (s)	4.4	4.3	4.5
Degree Utilization, x	0.16	0.16	0.25
Capacity (veh/h)	754	799	774
Control Delay (s)	8.2	8.1	9.0
Approach Delay (s)	8.2	8.1	9.0
Approach LOS	A	A	A

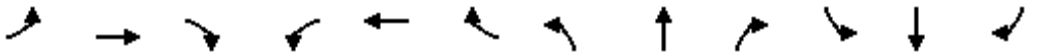
Intersection Summary			
Delay		8.5	
Level of Service		A	
Intersection Capacity Utilization		30.3%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	7	240	1	6	193	37	7	10	11	37	15	9
Future Volume (Veh/h)	7	240	1	6	193	37	7	10	11	37	15	9
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	261	1	7	210	40	8	11	12	40	16	10
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.93						0.93	0.93		0.93	0.93	0.93
vC, conflicting volume	253			273			554	556	280	550	536	237
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	160			273			484	485	280	480	464	143
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			98	97	98	91	96	99
cM capacity (veh/h)	1317			1278			428	438	746	434	450	837

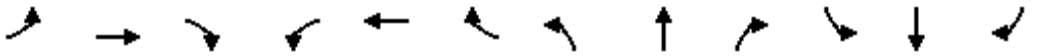
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	270	257	31	66
Volume Left	8	7	8	40
Volume Right	1	40	12	10
cSH	1317	1278	518	473
Volume to Capacity	0.01	0.01	0.06	0.14
Queue Length 95th (ft)	0	0	5	12
Control Delay (s)	0.3	0.3	12.4	13.8
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.3	12.4	13.8
Approach LOS			B	B

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	30.7%	ICU Level of Service	A
Analysis Period (min)	15		



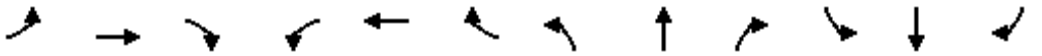
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	127	72	88	129	75	37	156	47	82	198	14
Future Volume (vph)	20	127	72	88	129	75	37	156	47	82	198	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	10	11	11	16	16	16
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1850	1534	1681	1764	1794	1652	3289		2006	2090	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1850	1534	1681	1764	1794	1652	3289		2006	2090	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	138	78	96	140	82	40	170	51	89	215	15
RTOR Reduction (vph)	0	0	67	0	0	69	0	32	0	0	2	0
Lane Group Flow (vph)	0	160	11	86	150	13	40	189	0	89	228	0
Confl. Peds. (#/hr)			10	10					3			
Confl. Bikes (#/hr)			4						3			
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		11.3	11.3	12.5	12.5	12.5	4.3	28.5		8.9	33.1	
Effective Green, g (s)		11.3	11.3	12.5	12.5	12.5	4.3	28.5		8.9	33.1	
Actuated g/C Ratio		0.14	0.14	0.16	0.16	0.16	0.05	0.36		0.11	0.41	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		261	216	262	275	280	88	1171		223	864	
v/s Ratio Prot		c0.09		0.05	c0.09		0.02	0.06		c0.04	c0.11	
v/s Ratio Perm			0.01			0.01						
v/c Ratio		0.61	0.05	0.33	0.55	0.05	0.45	0.16		0.40	0.26	
Uniform Delay, d1		32.3	29.7	30.0	31.1	28.7	36.7	17.6		33.1	15.4	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.0	0.0	0.9	2.5	0.1	1.4	0.3		1.2	0.7	
Delay (s)		35.3	29.7	30.9	33.6	28.8	38.1	17.9		34.2	16.2	
Level of Service		D	C	C	C	C	D	B		C	B	
Approach Delay (s)		33.5			31.6			21.0			21.2	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



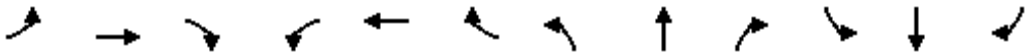
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	331	0	17	426	103	8	10	36	316	16	57
Future Volume (vph)	14	331	0	17	426	103	8	10	36	316	16	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		0.99	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.97			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3539		1756	3425			3131			1777	1527
Flt Permitted	0.32	1.00		0.52	1.00			0.91			0.69	1.00
Satd. Flow (perm)	589	3539		968	3425			2882			1286	1527
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	360	0	18	463	112	9	11	39	343	17	62
RTOR Reduction (vph)	0	0	0	0	49	0	0	17	0	0	0	26
Lane Group Flow (vph)	15	360	0	18	526	0	0	42	0	0	360	36
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	13.9	13.9		13.9	13.9			31.6			31.6	31.6
Effective Green, g (s)	13.9	13.9		13.9	13.9			31.6			31.6	31.6
Actuated g/C Ratio	0.25	0.25		0.25	0.25			0.57			0.57	0.57
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	148	894		244	865			1655			738	877
v/s Ratio Prot		0.10			c0.15							
v/s Ratio Perm	0.03			0.02				0.01			c0.28	0.02
v/c Ratio	0.10	0.40		0.07	0.61			0.03			0.49	0.04
Uniform Delay, d1	15.8	17.1		15.6	18.1			5.1			6.9	5.1
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.3	0.3		0.1	1.2			0.0			2.3	0.1
Delay (s)	16.1	17.4		15.8	19.4			5.1			9.2	5.2
Level of Service	B	B		B	B			A			A	A
Approach Delay (s)		17.3			19.3			5.1			8.6	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	15	17	37	9	142	3	235	75	119	317	17
Future Volume (vph)	25	15	17	37	9	142	3	235	75	119	317	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	10	11	16
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.96			1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected		0.98			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1742			1788	1794	1770	3841		1652	3396	
Flt Permitted		0.83			0.73	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1484			1353	1794	1770	3841		1652	3396	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	16	18	40	10	154	3	255	82	129	345	18
RTOR Reduction (vph)	0	15	0	0	0	132	0	48	0	0	5	0
Lane Group Flow (vph)	0	46	0	0	50	22	3	289	0	129	358	0
Confl. Peds. (#/hr)			4	4					3			
Confl. Bikes (#/hr)			1						2			
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		5.3			5.3	5.3	0.6	14.6		3.9	17.9	
Effective Green, g (s)		5.3			5.3	5.3	0.6	14.6		3.9	17.9	
Actuated g/C Ratio		0.14			0.14	0.14	0.02	0.39		0.10	0.48	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		209			191	253	28	1495		171	1621	
v/s Ratio Prot							0.00	0.08		c0.08	c0.11	
v/s Ratio Perm		0.03			c0.04	0.01						
v/c Ratio		0.22			0.26	0.09	0.11	0.19		0.75	0.22	
Uniform Delay, d1		14.3			14.4	14.0	18.2	7.6		16.3	5.7	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.2			0.3	0.1	1.7	0.1		17.1	0.1	
Delay (s)		14.5			14.6	14.0	19.9	7.6		33.4	5.8	
Level of Service		B			B	B	B	A		C	A	
Approach Delay (s)		14.5			14.2			7.7			13.0	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.30		
Actuated Cycle Length (s)	37.5	Sum of lost time (s)	13.7
Intersection Capacity Utilization	38.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	172	44	68	149	0	38	0	56	0	0	0
Future Volume (Veh/h)	0	172	44	68	149	0	38	0	56	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	187	48	74	162	0	41	0	61	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	162			235			521	521	211	582	545	162
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	162			235			521	521	211	582	545	162
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			94			91	100	93	100	100	100
cM capacity (veh/h)	1417			1332			446	434	829	376	421	883

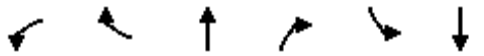
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	235	236	102	0
Volume Left	0	74	41	0
Volume Right	48	0	61	0
cSH	1417	1332	616	1700
Volume to Capacity	0.00	0.06	0.17	0.00
Queue Length 95th (ft)	0	4	15	0
Control Delay (s)	0.0	2.8	12.0	0.0
Lane LOS		A	B	A
Approach Delay (s)	0.0	2.8	12.0	0.0
Approach LOS			B	A

Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	38.9%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	79	13	3	56	1	23	0	10	1	0	1
Future Volume (Veh/h)	1	79	13	3	56	1	23	0	10	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	86	14	3	61	1	25	0	11	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	62			100			164	163	93	174	170	62
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	62			100			164	163	93	174	170	62
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			97	100	99	100	100	100
cM capacity (veh/h)	1541			1493			799	728	964	779	722	1004

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	101	65	36	2
Volume Left	1	3	25	1
Volume Right	14	1	11	1
cSH	1541	1493	843	877
Volume to Capacity	0.00	0.00	0.04	0.00
Queue Length 95th (ft)	0	0	3	0
Control Delay (s)	0.1	0.4	9.5	9.1
Lane LOS	A	A	A	A
Approach Delay (s)	0.1	0.4	9.5	9.1
Approach LOS			A	A

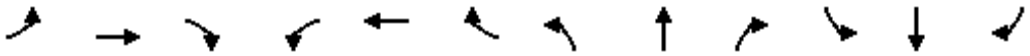
Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	15.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	29	91	12	29	113	12
Future Volume (vph)	29	91	12	29	113	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	99	13	32	123	13

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	131	45	136
Volume Left (vph)	32	0	123
Volume Right (vph)	99	32	0
Hadj (s)	-0.37	-0.39	0.21
Departure Headway (s)	3.9	3.9	4.4
Degree Utilization, x	0.14	0.05	0.17
Capacity (veh/h)	874	870	787
Control Delay (s)	7.6	7.1	8.3
Approach Delay (s)	7.6	7.1	8.3
Approach LOS	A	A	A

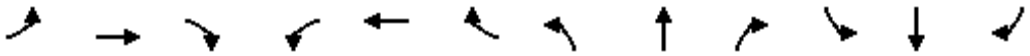
Intersection Summary			
Delay	7.8		
Level of Service	A		
Intersection Capacity Utilization	27.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	82	118	19	55	4	89	13	19	19	15	7
Future Volume (Veh/h)	4	82	118	19	55	4	89	13	19	19	15	7
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	89	128	21	60	4	97	14	21	21	16	8
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	64			217			281	267	153	293	329	62
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	64			217			281	267	153	293	329	62
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			85	98	98	97	97	99
cM capacity (veh/h)	1538			1353			643	627	893	624	579	1003

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	221	85	132	45
Volume Left	4	21	97	21
Volume Right	128	4	21	8
cSH	1538	1353	671	650
Volume to Capacity	0.00	0.02	0.20	0.07
Queue Length 95th (ft)	0	1	18	6
Control Delay (s)	0.2	2.0	11.7	11.0
Lane LOS	A	A	B	B
Approach Delay (s)	0.2	2.0	11.7	11.0
Approach LOS			B	B

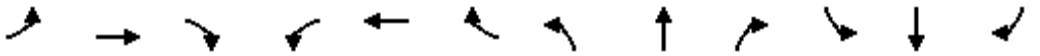
Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	31.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	61	20	14	38	6	6	5	39	2	7	2
Future Volume (Veh/h)	0	61	20	14	38	6	6	5	39	2	7	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	66	22	15	41	7	7	5	42	2	8	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	48			88			158	155	77	196	162	44
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	48			88			158	155	77	196	162	44
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			99	99	96	100	99	100
cM capacity (veh/h)	1559			1508			794	730	984	721	723	1025

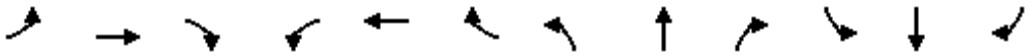
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	88	63	54	12
Volume Left	0	15	7	2
Volume Right	22	7	42	2
cSH	1559	1508	925	760
Volume to Capacity	0.00	0.01	0.06	0.02
Queue Length 95th (ft)	0	1	5	1
Control Delay (s)	0.0	1.8	9.1	9.8
Lane LOS		A	A	A
Approach Delay (s)	0.0	1.8	9.1	9.8
Approach LOS			A	A

Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	20.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	47	24	54	22	14	30	160	27	33	175	6
Future Volume (vph)	41	47	24	54	22	14	30	160	27	33	175	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.98		1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1776			1771		1770	3463		1770	3520	
Flt Permitted		0.84			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1515			1824		1770	3463		1770	3520	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	45	51	26	59	24	15	33	174	29	36	190	7
RTOR Reduction (vph)	0	17	0	0	12	0	0	15	0	0	3	0
Lane Group Flow (vph)	0	105	0	0	86	0	33	188	0	36	194	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		3.5			3.1		0.8	15.6		0.6	15.2	
Effective Green, g (s)		3.5			3.1		0.8	15.6		0.6	15.2	
Actuated g/C Ratio		0.11			0.09		0.02	0.47		0.02	0.46	
Clearance Time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		159			169		42	1622		31	1606	
v/s Ratio Prot							c0.02	0.05		c0.02	c0.06	
v/s Ratio Perm		c0.07			0.05							
v/c Ratio		0.66			0.51		0.79	0.12		1.16	0.12	
Uniform Delay, d1		14.3			14.4		16.2	5.0		16.3	5.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		9.8			3.0		58.6	0.0		214.2	0.0	
Delay (s)		24.2			17.4		74.8	5.0		230.6	5.2	
Level of Service		C			B		E	A		F	A	
Approach Delay (s)		24.2			17.4			14.8			40.1	
Approach LOS		C			B			B			D	

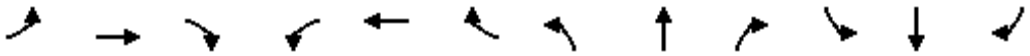
Intersection Summary			
HCM 2000 Control Delay	25.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	33.3	Sum of lost time (s)	14.2
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	32	110	31	36	62	27	12	40	30	21	33	38
Future Volume (Veh/h)	32	110	31	36	62	27	12	40	30	21	33	38
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	120	34	39	67	29	13	43	33	23	36	41
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	96			154			426	381	137	421	384	82
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	96			154			426	381	137	421	384	82
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			97			97	92	96	95	93	96
cM capacity (veh/h)	1498			1426			471	524	911	472	522	978

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	189	135	89	100
Volume Left	35	39	13	23
Volume Right	34	29	33	41
cSH	1498	1426	610	627
Volume to Capacity	0.02	0.03	0.15	0.16
Queue Length 95th (ft)	2	2	13	14
Control Delay (s)	1.5	2.4	11.9	11.8
Lane LOS	A	A	B	B
Approach Delay (s)	1.5	2.4	11.9	11.8
Approach LOS			B	B

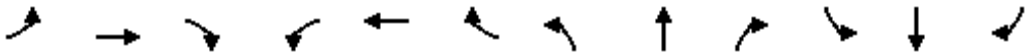
Intersection Summary				
Average Delay	5.6			
Intersection Capacity Utilization	26.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	2	68	17	10	42	1	14	18	24	6	9	3
Future Volume (vph)	2	68	17	10	42	1	14	18	24	6	9	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	74	18	11	46	1	15	20	26	7	10	3

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	94	58	61	20
Volume Left (vph)	2	11	15	7
Volume Right (vph)	18	1	26	3
Hadj (s)	-0.08	0.06	-0.17	0.01
Departure Headway (s)	4.1	4.2	4.1	4.3
Degree Utilization, x	0.11	0.07	0.07	0.02
Capacity (veh/h)	863	828	843	800
Control Delay (s)	7.5	7.5	7.4	7.4
Approach Delay (s)	7.5	7.5	7.4	7.4
Approach LOS	A	A	A	A

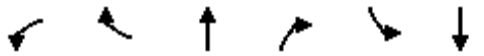
Intersection Summary				
Delay	7.5			
Level of Service	A			
Intersection Capacity Utilization	18.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	108	4	22	49	18	4	49	94	139	9	7
Future Volume (vph)	7	108	4	22	49	18	4	49	94	139	9	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	117	4	24	53	20	4	53	102	151	10	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	129	97	159	169
Volume Left (vph)	8	24	4	151
Volume Right (vph)	4	20	102	8
Hadj (s)	0.03	-0.04	-0.35	0.18
Departure Headway (s)	4.8	4.8	4.3	4.8
Degree Utilization, x	0.17	0.13	0.19	0.23
Capacity (veh/h)	687	687	779	700
Control Delay (s)	8.9	8.5	8.4	9.3
Approach Delay (s)	8.9	8.5	8.4	9.3
Approach LOS	A	A	A	A

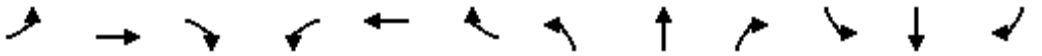
Intersection Summary				
Delay	8.8			
Level of Service	A			
Intersection Capacity Utilization	38.7%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	74	38	16	87	75
Future Volume (vph)	0	74	38	16	87	75
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	80	41	17	95	82

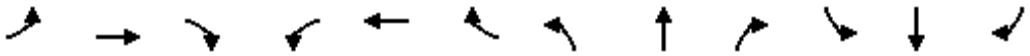
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	80	58	177
Volume Left (vph)	0	0	95
Volume Right (vph)	80	17	0
Hadj (s)	-0.57	-0.14	0.14
Departure Headway (s)	3.9	4.1	4.3
Degree Utilization, x	0.09	0.07	0.21
Capacity (veh/h)	880	844	826
Control Delay (s)	7.2	7.4	8.4
Approach Delay (s)	7.2	7.4	8.4
Approach LOS	A	A	A

Intersection Summary			
Delay	7.9		
Level of Service	A		
Intersection Capacity Utilization	18.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	130	43	245	53	206	31	215	117	175	304	7
Future Volume (vph)	17	130	43	245	53	206	31	215	117	175	304	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.95		1.00	1.00	
Flt Protected	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1555		1789	1794	1770	3752		2006	3997	
Flt Permitted	0.95	1.00	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1555		1789	1794	1770	3752		2006	3997	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	141	47	266	58	224	34	234	127	190	330	8
RTOR Reduction (vph)	0	0	42	0	0	150	0	85	0	0	2	0
Lane Group Flow (vph)	18	141	5	0	324	74	34	276	0	190	336	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	7.0	7.0	7.0		16.3	23.0	1.3	20.6		6.7	26.0	
Effective Green, g (s)	7.0	7.0	7.0		16.3	23.0	1.3	20.6		6.7	26.0	
Actuated g/C Ratio	0.10	0.10	0.10		0.23	0.33	0.02	0.30		0.10	0.37	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	201	187	156		418	591	33	1108		192	1490	
v/s Ratio Prot	0.01	c0.08			c0.18	0.04	0.02	0.07		c0.09	c0.08	
v/s Ratio Perm			0.00									
v/c Ratio	0.09	0.75	0.03		0.78	0.13	1.03	0.25		0.99	0.23	
Uniform Delay, d1	28.5	30.5	28.3		25.0	16.3	34.2	18.7		31.5	15.0	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	14.1	0.0		8.7	0.1	166.0	0.5		61.3	0.4	
Delay (s)	28.5	44.6	28.3		33.7	16.4	200.2	19.2		92.7	15.3	
Level of Service	C	D	C		C	B	F	B		F	B	
Approach Delay (s)		39.5			26.6			34.8			43.2	
Approach LOS		D			C			C			D	

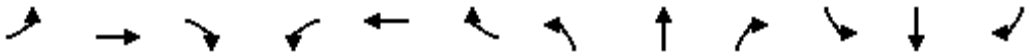
Intersection Summary			
HCM 2000 Control Delay	35.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	69.7	Sum of lost time (s)	19.1
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	349	5	16	521	50	0	0	27	28	0	30
Future Volume (Veh/h)	8	349	5	16	521	50	0	0	27	28	0	30
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	379	5	17	566	54	0	0	29	30	0	33
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.95			0.95	0.95	0.95	0.95	0.95	
vC, conflicting volume	620			384			1060	1054	382	1056	1029	593
vC1, stage 1 conf vol							400	400		627	627	
vC2, stage 2 conf vol							660	654		428	402	
vCu, unblocked vol	620			323			1035	1029	320	1031	1003	593
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			100	100	96	92	100	93
cM capacity (veh/h)	960			1173			367	395	683	390	406	506

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	393	637	29	63
Volume Left	9	17	0	30
Volume Right	5	54	29	33
cSH	960	1173	683	443
Volume to Capacity	0.01	0.01	0.04	0.14
Queue Length 95th (ft)	1	1	3	12
Control Delay (s)	0.3	0.4	10.5	14.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.3	0.4	10.5	14.5
Approach LOS			B	B

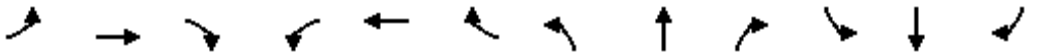
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	55.1%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	11	420	10	30	661	28	10	4	66	34	4	17
Future Volume (Veh/h)	11	420	10	30	661	28	10	4	66	34	4	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	457	11	33	718	30	11	4	72	37	4	18
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked												
vC, conflicting volume	748			469			1292	1302	464	1354	1292	734
vC1, stage 1 conf vol							488	488		799	799	
vC2, stage 2 conf vol							805	814		555	493	
vCu, unblocked vol	748			469			1292	1302	464	1354	1292	734
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			96	99	88	87	99	96
cM capacity (veh/h)	861			1092			298	325	598	287	330	420

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	12	468	33	748	87	59
Volume Left	12	0	33	0	11	37
Volume Right	0	11	0	30	72	18
cSH	861	1700	1092	1700	513	321
Volume to Capacity	0.01	0.28	0.03	0.44	0.17	0.18
Queue Length 95th (ft)	1	0	2	0	15	17
Control Delay (s)	9.2	0.0	8.4	0.0	13.4	18.7
Lane LOS	A		A		B	C
Approach Delay (s)	0.2		0.4		13.4	18.7
Approach LOS					B	C

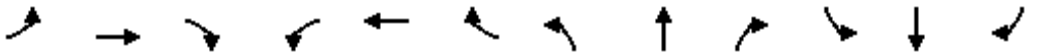
Intersection Summary				
Average Delay	1.9			
Intersection Capacity Utilization	53.0%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	600	0	0	774	124	0	0	0	0	0	21
Future Volume (Veh/h)	26	600	0	0	774	124	0	0	0	0	0	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	28	652	0	0	841	135	0	0	0	0	0	23
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	976			652			1572	1684	652	1616	1616	908
vC1, stage 1 conf vol							708	708		908	908	
vC2, stage 2 conf vol							864	976		708	708	
vCu, unblocked vol	976			652			1572	1684	652	1616	1616	908
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	100	100	93
cM capacity (veh/h)	707			935			246	253	468	262	281	333

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	28	652	0	976	0	23
Volume Left	28	0	0	0	0	0
Volume Right	0	0	0	135	0	23
cSH	707	1700	1700	1700	1700	333
Volume to Capacity	0.04	0.38	0.00	0.57	0.00	0.07
Queue Length 95th (ft)	3	0	0	0	0	6
Control Delay (s)	10.3	0.0	0.0	0.0	0.0	16.6
Lane LOS	B				A	C
Approach Delay (s)	0.4		0.0		0.0	16.6
Approach LOS					A	C

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	58.3%	ICU Level of Service		B
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	85	0	0	58	36	267	23	40	604	13
Future Volume (Veh/h)	0	0	85	0	0	58	36	267	23	40	604	13
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	92	0	0	63	39	290	25	43	657	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1036	1143	664	1216	1138	158	671			315		
vC1, stage 1 conf vol	750	750		380	380							
vC2, stage 2 conf vol	286	393		835	757							
vCu, unblocked vol	1036	1143	664	1216	1138	158	671			315		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	77	100	100	93	96			97		
cM capacity (veh/h)	323	352	403	197	332	860	915			1242		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	92	63	39	193	122	43	671
Volume Left	0	0	39	0	0	43	0
Volume Right	92	63	0	0	25	0	14
cSH	403	860	915	1700	1700	1242	1700
Volume to Capacity	0.23	0.07	0.04	0.11	0.07	0.03	0.39
Queue Length 95th (ft)	22	6	3	0	0	3	0
Control Delay (s)	16.6	9.5	9.1	0.0	0.0	8.0	0.0
Lane LOS	C	A	A			A	
Approach Delay (s)	16.6	9.5	1.0			0.5	
Approach LOS	C	A					

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	44.5%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Michigan Avenue
Agency or Co.	IBI Group	E/W Street Name	Michigan Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	89	14	38	0	48	16	8	0	23	235	6	0	6	230	28
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	99	16	42	0	53	18	9	0	26	261	7	0	7	255	31
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		157			80			294			293	
Entry Volume veh/h		154			78			288			287	
Circulating Flow (v_c), pc/h	315			386			122			97		
Exiting Flow (v_{ex}), pc/h	30			75			369			350		
Capacity (c_{pce}), pc/h		825			768			1000			1026	
Capacity (c), veh/h		809			753			981			1005	
v/c Ratio (x)		0.19			0.10			0.29			0.29	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.4			5.9			6.7			6.4	
Lane LOS		A			A			A			A	
95% Queue, veh		0.7			0.3			1.2			1.2	
Approach Delay, s/veh	6.4			5.9			6.7			6.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.5						A					

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HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - West
Agency or Co.	IBI Group	E/W Street Name	West Street
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	17	10	8	0	14	10	30	0	8	94	14	0	30	94	17
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	19	11	9	0	16	11	33	0	9	104	16	0	33	104	19
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		39			60			129			156	
Entry Volume veh/h		38			59			126			153	
Circulating Flow (v_c), pc/h	153			132			63			36		
Exiting Flow (v_{ex}), pc/h	60			39			156			129		
Capacity (c_{pce}), pc/h		970			990			1061			1090	
Capacity (c), veh/h		951			971			1040			1069	
v/c Ratio (x)		0.04			0.06			0.12			0.14	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.1			4.3			4.5			4.6	
Lane LOS		A			A			A			A	
95% Queue, veh		0.1			0.2			0.4			0.5	
Approach Delay, s/veh	4.1			4.3			4.5			4.6		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	4.5						A					

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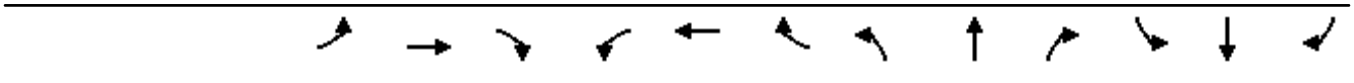
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	19	26	10	15	21	14	77	10	18	65	24
Future Volume (Veh/h)	9	19	26	10	15	21	14	77	10	18	65	24
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	21	28	11	16	23	15	84	11	20	71	26
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								737			527	
pX, platoon unblocked												
vC, conflicting volume	227	249	48	234	256	48	97			95		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	227	249	48	234	256	48	97			95		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	97	97	98	97	98	99			99		
cM capacity (veh/h)	667	637	1010	653	631	1011	1494			1497		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	59	50	57	53	56	62
Volume Left	10	11	15	0	20	0
Volume Right	28	23	0	11	0	26
cSH	780	770	1494	1700	1497	1700
Volume to Capacity	0.08	0.06	0.01	0.03	0.01	0.04
Queue Length 95th (ft)	6	5	1	0	1	0
Control Delay (s)	10.0	10.0	2.0	0.0	2.7	0.0
Lane LOS	A	A	A		A	
Approach Delay (s)	10.0	10.0	1.0		1.3	
Approach LOS	A	A				

Intersection Summary					
Average Delay	4.0				
Intersection Capacity Utilization	Err%	ICU Level of Service		H	
Analysis Period (min)	15				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	149	6	32	7	66	7	22	734	17
Future Volume (veh/h)	0	0	0	149	6	32	7	66	7	22	734	17
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				167	0	0	8	72	0	24	798	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				1328	0	593	148	1692	527	148	1178	527
Arrive On Green				0.36	0.00	0.00	0.08	0.32	0.00	0.08	0.32	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				167	0	0	8	72	0	24	798	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.4	0.0
Cycle Q Clear(g_c), s				1.5	0.0	0.0	0.2	0.5	0.0	0.6	9.4	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				1328	0	593	148	1692	527	148	1178	527
V/C Ratio(X)				0.13	0.00	0.00	0.05	0.04	0.00	0.16	0.68	0.00
Avail Cap(c_a), veh/h				1328	0	593	148	1692	527	148	1178	527
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				10.7	0.0	0.0	21.3	11.7	0.0	21.4	14.8	0.0
Incr Delay (d2), s/veh				0.2	0.0	0.0	0.7	0.0	0.0	2.4	3.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				0.8	0.0	0.0	0.1	0.2	0.0	0.4	5.3	0.0
LnGrp Delay(d),s/veh				10.9	0.0	0.0	21.9	11.8	0.0	23.8	17.9	0.0
LnGrp LOS				B			C	B		C	B	
Approach Vol, veh/h					167			80			822	
Approach Delay, s/veh					10.9			12.8			18.1	
Approach LOS					B			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	20.0			8.0	20.0		22.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	16.0			4.0	16.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	2.5			2.2	11.4		3.5
Green Ext Time (p_c), s	0.0	0.2			0.0	2.2		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	16.6
HCM 2010 LOS	B

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	530	191	460	1082	0	0
Future Volume (veh/h)	530	191	460	1082	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	576	208	500	1176		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	1840	823	1074	3313		
Arrive On Green	0.50	0.50	0.30	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	576	208	500	1176		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	3.7	2.9	4.5	1.9		
Cycle Q Clear(g_c), s	3.7	2.9	4.5	1.9		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	1840	823	1074	3313		
V/C Ratio(X)	0.31	0.25	0.47	0.35		
Avail Cap(c_a), veh/h	1840	823	1074	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.9	5.7	11.4	0.3		
Incr Delay (d2), s/veh	0.4	0.7	1.5	0.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.0	1.4	2.4	1.0		
LnGrp Delay(d),s/veh	6.4	6.5	12.8	0.6		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	784			1676		
Approach Delay, s/veh	6.4			4.2		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			16.0	24.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			12.0	20.0				36.0
Max Q Clear Time (g_c+I1), s			6.5	5.7				3.9
Green Ext Time (p_c), s			1.0	4.0				10.8

Intersection Summary	
HCM 2010 Ctrl Delay	4.9
HCM 2010 LOS	A



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	559	67	750	1720	67	1
Future Volume (veh/h)	559	67	750	1720	67	1
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	608	73	815	1870	73	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	982	439	954	2208	492	439
Arrive On Green	0.27	0.27	0.27	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	608	73	815	1870	73	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	8.7	2.0	13.0	24.8	1.8	0.0
Cycle Q Clear(g_c), s	8.7	2.0	13.0	24.8	1.8	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	982	439	954	2208	492	439
V/C Ratio(X)	0.62	0.17	0.85	0.85	0.15	0.00
Avail Cap(c_a), veh/h	982	439	954	2208	492	439
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	19.3	16.9	20.9	9.8	16.8	0.0
Incr Delay (d2), s/veh	2.9	0.8	9.6	4.2	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.8	1.0	7.6	13.5	1.0	0.0
LnGrp Delay(d),s/veh	22.3	17.7	30.5	14.0	17.4	0.0
LnGrp LOS	C	B	C	B	B	
Approach Vol, veh/h	681			2685	73	
Approach Delay, s/veh	21.8			19.0	17.4	
Approach LOS	C			B	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	16.0	16.0				36.0
Max Q Clear Time (g_c+I1), s		3.8	15.0	10.7				26.8
Green Ext Time (p_c), s		0.1	0.4	2.0				7.6

Intersection Summary	
HCM 2010 Ctrl Delay	19.5
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	296	3	94	513	156	10	0	113	20	31	31
Future Volume (veh/h)	0	296	3	94	513	156	10	0	113	20	31	31
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	322	3	102	558	0	11	0	123	22	34	34
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1150	11	284	1982	887	0	0	0	568	596	507
Arrive On Green	0.00	0.31	0.31	0.15	0.54	0.00	0.00	0.00	0.00	0.31	0.31	0.31
Sat Flow, veh/h	0	3834	35	1845	3681	1647		0		1845	1937	1647
Grp Volume(v), veh/h	0	158	167	102	558	0		0.0		22	34	34
Grp Sat Flow(s),veh/h/ln	0	1840	1931	1845	1840	1647				1845	1937	1647
Q Serve(g_s), s	0.0	3.4	3.4	2.6	4.3	0.0				0.4	0.6	0.8
Cycle Q Clear(g_c), s	0.0	3.4	3.4	2.6	4.3	0.0				0.4	0.6	0.8
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	566	594	284	1982	887				568	596	507
V/C Ratio(X)	0.00	0.28	0.28	0.36	0.28	0.00				0.04	0.06	0.07
Avail Cap(c_a), veh/h	0	566	594	284	1982	887				568	596	507
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	13.6	13.6	19.7	6.5	0.0				12.6	12.7	12.7
Incr Delay (d2), s/veh	0.0	1.2	1.2	3.5	0.4	0.0				0.1	0.2	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.9	2.0	1.6	2.3	0.0				0.2	0.4	0.4
LnGrp Delay(d),s/veh	0.0	14.9	14.8	23.2	6.9	0.0				12.7	12.9	13.0
LnGrp LOS		B	B	C	A					B	B	B
Approach Vol, veh/h		325			660						90	
Approach Delay, s/veh		14.8			9.4						12.9	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			12.0	20.0		20.0		32.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			8.0	16.0		16.0		28.0
Max Q Clear Time (g_c+I1), s			4.6	5.4		2.8		6.3
Green Ext Time (p_c), s			0.1	1.3		0.2		3.8

Intersection Summary	
HCM 2010 Ctrl Delay	11.3
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	233	492	5	9	647	329	10	10	19	128	2	57
Future Volume (veh/h)	233	492	5	9	647	329	10	10	19	128	2	57
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	253	535	5	10	703	358	11	11	21	102	54	62
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	158	961	9	105	841	376	216	216	376	422	188	216
Arrive On Green	0.09	0.26	0.26	0.02	0.08	0.08	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3737	35	1845	3681	1647	945	945	1647	1845	824	946
Grp Volume(v), veh/h	253	263	277	10	703	358	22	0	21	102	0	116
Grp Sat Flow(s),veh/h/ln	1845	1840	1931	1845	1840	1647	1890	0	1647	1845	0	1770
Q Serve(g_s), s	6.0	8.7	8.7	0.4	13.2	15.2	0.6	0.0	0.7	3.2	0.0	3.8
Cycle Q Clear(g_c), s	6.0	8.7	8.7	0.4	13.2	15.2	0.6	0.0	0.7	3.2	0.0	3.8
Prop In Lane	1.00		0.02	1.00		1.00	0.50		1.00	1.00		0.53
Lane Grp Cap(c), veh/h	158	473	497	105	841	376	432	0	376	422	0	405
V/C Ratio(X)	1.60	0.56	0.56	0.09	0.84	0.95	0.05	0.00	0.06	0.24	0.00	0.29
Avail Cap(c_a), veh/h	158	473	497	105	841	376	432	0	376	422	0	405
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	32.0	22.5	22.5	32.6	31.1	32.0	21.1	0.0	21.1	22.0	0.0	22.3
Incr Delay (d2), s/veh	297.5	4.7	4.5	1.8	9.6	35.6	0.2	0.0	0.3	1.4	0.0	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	16.1	5.0	5.2	0.2	7.9	10.6	0.4	0.0	0.3	1.8	0.0	2.0
LnGrp Delay(d),s/veh	329.5	27.2	27.0	34.3	40.7	67.5	21.3	0.0	21.4	23.4	0.0	24.1
LnGrp LOS	F	C	C	C	D	E	C		C	C		C
Approach Vol, veh/h		793			1071			43			218	
Approach Delay, s/veh		123.6			49.6			21.3			23.8	
Approach LOS		F			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	10.0	20.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	6.0	16.0
Max Q Clear Time (g_c+I1), s		2.7	2.4	10.7		5.8	8.0	17.2
Green Ext Time (p_c), s		0.1	0.0	1.9		0.6	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	74.0
HCM 2010 LOS	E

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	394	290	84	780	168	257	128	80	206	268	184
Future Volume (veh/h)	71	394	290	84	780	168	257	128	80	206	268	184
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	77	428	315	91	848	183	209	237	87	224	291	200
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	464	339	132	894	400	448	470	400	422	443	376
Arrive On Green	0.02	0.08	0.08	0.07	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23
Sat Flow, veh/h	1845	2031	1485	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	77	388	355	91	848	183	209	237	87	224	291	200
Grp Sat Flow(s),veh/h/ln	1845	1840	1675	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.9	14.6	14.8	3.4	15.9	6.6	6.8	7.4	3.0	7.5	9.5	7.5
Cycle Q Clear(g_c), s	2.9	14.6	14.8	3.4	15.9	6.6	6.8	7.4	3.0	7.5	9.5	7.5
Prop In Lane	1.00		0.89	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	421	383	132	894	400	448	470	400	422	443	376
V/C Ratio(X)	0.73	0.92	0.93	0.69	0.95	0.46	0.47	0.50	0.22	0.53	0.66	0.53
Avail Cap(c_a), veh/h	105	421	383	132	894	400	448	470	400	422	443	376
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.8	31.7	31.8	31.7	26.1	22.6	22.6	22.9	21.2	23.7	24.5	23.7
Incr Delay (d2), s/veh	35.7	28.0	31.0	25.7	20.0	3.7	3.5	3.8	1.2	4.7	7.4	5.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	10.7	10.1	2.7	10.5	3.4	3.9	4.4	1.5	4.3	6.0	3.9
LnGrp Delay(d),s/veh	69.5	59.7	62.8	57.5	46.0	26.3	26.1	26.7	22.4	28.4	31.9	29.0
LnGrp LOS	E	E	E	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		820			1122			533			715	
Approach Delay, s/veh		62.0			43.7			25.8			30.0	
Approach LOS		E			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	20.0		20.0	8.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	16.0		16.0	4.0	17.0
Max Q Clear Time (g_c+I1), s		9.4	5.4	16.8		11.5	4.9	17.9
Green Ext Time (p_c), s		1.5	0.0	0.0		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	42.3
HCM 2010 LOS	D

Notes

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	25	89	7	15	67	40	2	2	5	0	0	0
Future Vol, veh/h	25	89	7	15	67	40	2	2	5	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	27	97	8	16	73	43	2	2	5	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.8	7.6	7.2
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	22%	21%	12%
Vol Thru, %	22%	74%	55%
Vol Right, %	56%	6%	33%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	9	121	122
LT Vol	2	25	15
Through Vol	2	89	67
RT Vol	5	7	40
Lane Flow Rate	10	132	133
Geometry Grp	1	1	1
Degree of Util (X)	0.011	0.148	0.143
Departure Headway (Hd)	4.198	4.057	3.877
Convergence, Y/N	Yes	Yes	Yes
Cap	858	884	923
Service Time	2.198	2.082	1.907
HCM Lane V/C Ratio	0.012	0.149	0.144
HCM Control Delay	7.2	7.8	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.5	0.5

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	136	67	44	54	0	0	0	0	16	0	53
Future Vol, veh/h	0	136	67	44	54	0	0	0	0	16	0	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	148	73	48	59	0	0	0	0	17	0	58

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	148	0	0			303	303	59
Stage 1	-	-	-	-	-	-			155	155	-
Stage 2	-	-	-	-	-	-			148	148	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1434	-	0			689	610	1007
Stage 1	0	-	-	-	-	0			873	769	-
Stage 2	0	-	-	-	-	0			880	775	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1434	-	-			665	0	1007
Mov Cap-2 Maneuver	-	-	-	-	-	-			665	0	-
Stage 1	-	-	-	-	-	-			842	0	-
Stage 2	-	-	-	-	-	-			880	0	-

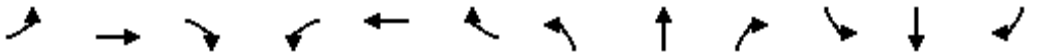
Approach	EB	WB	SB
HCM Control Delay, s	0	3.4	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1434	-	665	1007
HCM Lane V/C Ratio	-	-	0.033	-	0.026	0.057
HCM Control Delay (s)	-	-	7.6	0	10.6	8.8
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	392	145	180	931	12	171
Future Volume (veh/h)	392	145	180	931	12	171
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	426	0	196	1012	13	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1595	714	358	1162	492	773
Arrive On Green	0.43	0.00	0.10	0.60	0.27	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	426	0	196	1012	13	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	4.5	0.0	3.1	26.3	0.3	0.0
Cycle Q Clear(g_c), s	4.5	0.0	3.1	26.3	0.3	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1595	714	358	1162	492	773
V/C Ratio(X)	0.27	0.00	0.55	0.87	0.03	0.00
Avail Cap(c_a), veh/h	1595	714	358	1162	492	773
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	10.9	0.0	25.7	10.1	16.2	0.0
Incr Delay (d2), s/veh	0.4	0.0	5.9	9.0	0.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	0.0	1.8	16.7	0.2	0.0
LnGrp Delay(d),s/veh	11.3	0.0	31.6	19.1	16.3	0.0
LnGrp LOS	B		C	B	B	
Approach Vol, veh/h	426			1208	13	
Approach Delay, s/veh	11.3			21.1	16.3	
Approach LOS	B			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	10.0	30.0				40.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	6.0	26.0				36.0
Max Q Clear Time (g_c+I1), s		2.3	5.1	6.5				28.3
Green Ext Time (p_c), s		0.0	0.1	2.7				4.5

Intersection Summary	
HCM 2010 Ctrl Delay	18.5
HCM 2010 LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	271	107	194	477	305	1669	214	38	179	120	74	78
Future Volume (vph)	271	107	194	477	305	1669	214	38	179	120	74	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Lane Util. Factor	1.00	1.00	1.00	1.00	0.91	0.91		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.89	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1770	1863	1583	1770	3018	1441		1787	1583		1807	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (perm)	1770	1863	1583	1770	3018	1441		1787	1583		1807	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	295	116	211	518	332	1814	233	41	195	130	80	85
RTOR Reduction (vph)	0	0	190	0	495	500	0	0	117	0	0	71
Lane Group Flow (vph)	295	116	21	518	744	407	0	274	78	0	210	14
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	16.7	9.8	9.8	33.7	28.4	28.4		21.2	21.2		17.0	17.0
Effective Green, g (s)	16.7	9.8	9.8	33.7	28.4	28.4		21.2	21.2		17.0	17.0
Actuated g/C Ratio	0.17	0.10	0.10	0.34	0.28	0.28		0.21	0.21		0.17	0.17
Clearance Time (s)	4.5	4.6	4.6	4.5	3.0	3.0		4.6	4.6		4.6	4.6
Vehicle Extension (s)	3.0	0.2	0.2	3.0	0.2	0.2		0.2	0.2		0.2	0.2
Lane Grp Cap (vph)	295	182	155	596	857	409		378	335		307	269
v/s Ratio Prot	0.17	0.06		c0.29	0.25			c0.15			c0.12	
v/s Ratio Perm			0.01			c0.28			0.05			0.01
v/c Ratio	1.00	0.64	0.13	0.87	0.98dr	0.99		0.72	0.23		0.68	0.05
Uniform Delay, d1	41.6	43.4	41.2	31.1	34.0	35.7		36.7	32.7		39.0	34.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Incremental Delay, d2	52.4	5.3	0.1	12.8	9.0	42.6		11.5	1.6		11.7	0.4
Delay (s)	94.1	48.7	41.4	43.9	43.0	78.3		48.2	34.3		50.7	35.1
Level of Service	F	D	D	D	D	E		D	C		D	D
Approach Delay (s)		67.7			55.2			42.4			46.2	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	55.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.3
Intersection Capacity Utilization	108.7%	ICU Level of Service	G
Analysis Period (min)	15		

dr Defacto Right Lane. Recode with 1 though lane as a right lane.

c Critical Lane Group

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - SR-76 Ramps
E/W Street Name	SR-76 Ramps
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	2	0	0	0	1	0	0	1	1	0
Lane Assignment			LTR		LT		T				LT		L		TR	
Volume (V), veh/h	0	0	0	0	0	671	0	323	0	0	438	684	0	557	561	0
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	0	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	0	0	0	0	744	0	351	0	0	486	758	0	618	622	0
Right-Turn Bypass	None				Non-Yielding				Non-Yielding				None			
Conflicting Lanes	2				2				2				2			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929		4.6453	4.3276			4.3276		4.6453	4.3276	
Follow-Up Headway (s)		3.1858		2.6667	2.5352			2.5352		2.6667	2.5352	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		0		0	744	351		486	758	618	622	
Entry Volume veh/h		0		0	729	351		476	743	606	610	
Circulating Flow (v_c), pc/h	1984			486			618			744		
Exiting Flow (v_{ex}), pc/h	618			0			486			1366		
Capacity (c_{pce}), pc/h		155		863	939			840		681	754	
Capacity (c), veh/h		152		846	921			823		668	740	
v/c Ratio (x)		0.00		0.00	0.79			0.58		0.91	0.82	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		23.6		4.3	20.9	0.0		13.1	0.0	40.5	27.5	
Lane LOS		C		A	C	A		B	A	E	D	
95% Queue, veh		0.0		0.0	8.4			3.8		11.7	9.0	
Approach Delay, s/veh				14.1			5.1			34.0		
Approach LOS				B			A			D		
Intersection Delay, s/veh | LOS	17.9						C					

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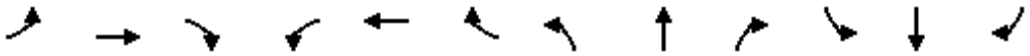
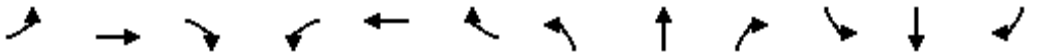


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	21	11	93	37	161	18	105	97	185	143	12
Future Volume (vph)	0	21	11	93	37	161	18	105	97	185	143	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	23	12	101	40	175	20	114	105	201	155	13

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	35	316	239	369
Volume Left (vph)	0	101	20	201
Volume Right (vph)	12	175	105	13
Hadj (s)	-0.17	-0.23	-0.21	0.12
Departure Headway (s)	6.0	5.4	5.3	5.4
Degree Utilization, x	0.06	0.47	0.35	0.55
Capacity (veh/h)	488	624	625	635
Control Delay (s)	9.4	13.0	11.1	14.9
Approach Delay (s)	9.4	13.0	11.1	14.9
Approach LOS	A	B	B	B

Intersection Summary				
Delay	13.1			
Level of Service	B			
Intersection Capacity Utilization	64.6%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	251	68	105	14	60	34	74	748	22	55	757	181
Future Volume (vph)	251	68	105	14	60	34	74	748	22	55	757	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1792	1583		1772		1770	1855		1770	1863	1583
Flt Permitted		0.72	1.00		0.95		0.13	1.00		0.13	1.00	1.00
Satd. Flow (perm)		1342	1583		1696		242	1855		243	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	273	74	114	15	65	37	80	813	24	60	823	197
RTOR Reduction (vph)	0	0	74	0	24	0	0	2	0	0	0	90
Lane Group Flow (vph)	0	347	40	0	93	0	80	835	0	60	823	107
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		21.3	21.3		21.3		31.5	31.5		32.7	32.7	32.7
Effective Green, g (s)		21.3	21.3		21.3		31.5	31.5		32.7	32.7	32.7
Actuated g/C Ratio		0.36	0.36		0.36		0.52	0.52		0.55	0.55	0.55
Clearance Time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		7.0	7.0	7.0
Lane Grp Cap (vph)		476	561		602		127	973		132	1015	862
v/s Ratio Prot								c0.45			0.44	
v/s Ratio Perm		c0.26	0.03		0.05		0.33			0.25		0.07
v/c Ratio		0.73	0.07		0.15		0.63	0.86		0.45	0.81	0.12
Uniform Delay, d1		16.8	12.8		13.2		10.1	12.3		8.3	11.1	6.7
Progression Factor		1.00	1.00		1.00		0.72	0.76		1.00	1.00	1.00
Incremental Delay, d2		8.6	0.2		0.4		19.0	8.7		10.9	7.0	0.3
Delay (s)		25.5	13.0		13.6		26.4	18.1		19.1	18.2	7.0
Level of Service		C	B		B		C	B		B	B	A
Approach Delay (s)		22.4			13.6			18.8			16.2	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Civic Center Drive
Agency or Co.	IBI Group	E/W Street Name	Civic Center Drive
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	31	29	28	0	24	34	48	0	23	765	44	0	27	799	26
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	34	32	31	0	27	38	53	0	26	848	49	0	30	886	29
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		97			118			923			945	
Entry Volume veh/h		95			116			905			926	
Circulating Flow (v_c), pc/h	943			908			96			91		
Exiting Flow (v_{ex}), pc/h	111			93			935			944		
Capacity (c_{pce}), pc/h		440			456			1027			1032	
Capacity (c), veh/h		431			447			1006			1011	
v/c Ratio (x)		0.22			0.26			0.90			0.92	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		11.8			12.1			29.7			31.9	
Lane LOS		B			B			D			D	
95% Queue, veh		0.8			1.0			13.1			14.1	
Approach Delay, s/veh	11.8			12.1			29.7			31.9		
Approach LOS	B			B			D			D		
Intersection Delay, s/veh | LOS	28.9						D					

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HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	7/11/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Highway - Pier View Way
E/W Street Name	Pier View Way
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	100	39	109	0	4	39	11	0	83	811	8	0	5	811	189
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	111	43	121	0	4	43	12	0	92	899	9	0	6	899	210
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		275			59			1000			1115	
Entry Volume veh/h		270			58			980			1093	
Circulating Flow (v_c), pc/h		909			1102			160			139	
Exiting Flow (v_{ex}), pc/h		58			345			1022			1024	
Capacity (c_{pce}), pc/h		455			375			963			983	
Capacity (c), veh/h		446			368			944			964	
v/c Ratio (x)		0.60			0.16			1.04			1.13	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		22.6			12.4			60.6			91.9	
Lane LOS		C			B			F			F	
95% Queue, veh		3.9			0.6			21.6			29.9	
Approach Delay, s/veh	22.6			12.4			60.6			91.9		
Approach LOS	C			B			F			F		
Intersection Delay, s/veh | LOS	69.4						F					

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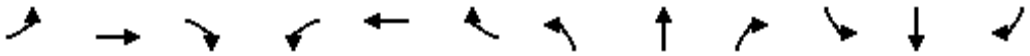
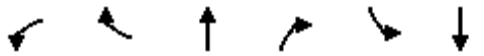


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	18	11	159	64	11	14	55	399	30	14	359	15
Future Volume (vph)	18	11	159	64	11	14	55	399	30	14	359	15
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	12	173	70	12	15	60	434	33	15	390	16

Direction, Lane #	EB 1	EB 2	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	32	173	97	277	250	210	211
Volume Left (vph)	20	0	70	60	0	15	0
Volume Right (vph)	0	173	15	0	33	0	16
Hadj (s)	0.35	-0.67	0.09	0.14	-0.06	0.07	-0.02
Departure Headway (s)	7.4	6.4	7.2	6.3	6.1	6.3	6.2
Degree Utilization, x	0.07	0.31	0.19	0.48	0.42	0.37	0.37
Capacity (veh/h)	448	520	455	558	574	543	552
Control Delay (s)	9.7	11.0	11.9	13.8	12.2	11.8	11.6
Approach Delay (s)	10.8		11.9	13.0		11.7	
Approach LOS	B		B	B		B	

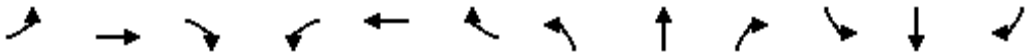
Intersection Summary				
Delay	12.1			
Level of Service	B			
Intersection Capacity Utilization	46.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	296	102	185	206	74	216
Future Volume (vph)	296	102	185	206	74	216
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	322	111	201	224	80	235

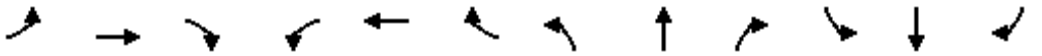
Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total (vph)	322	111	425	315
Volume Left (vph)	322	0	0	80
Volume Right (vph)	0	111	224	0
Hadj (s)	0.53	-0.67	-0.28	0.08
Departure Headway (s)	7.1	5.9	5.6	6.1
Degree Utilization, x	0.63	0.18	0.66	0.53
Capacity (veh/h)	488	583	622	566
Control Delay (s)	20.4	9.0	18.5	15.7
Approach Delay (s)	17.5		18.5	15.7
Approach LOS	C		C	C

Intersection Summary			
Delay	17.4		
Level of Service	C		
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		



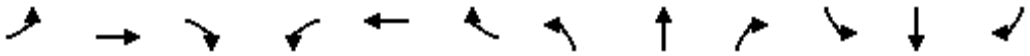
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	0	333	81	308	84	0	0	0	0	125	93
Future Volume (vph)	44	0	333	81	308	84	0	0	0	0	125	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5		4.5	4.5	4.5						4.5	
Lane Util. Factor	1.00		0.88	1.00	0.95						0.95	
Frt	1.00		0.85	1.00	0.97						0.94	
Flt Protected	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (prot)	1770		2787	1770	3426						3313	
Flt Permitted	0.95		1.00	0.95	1.00						1.00	
Satd. Flow (perm)	1770		2787	1770	3426						3313	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	0	362	88	335	91	0	0	0	0	136	101
RTOR Reduction (vph)	0	0	329	45	37	0	0	0	0	0	86	0
Lane Group Flow (vph)	48	0	33	43	389	0	0	0	0	0	151	0
Turn Type	Prot		Prot	Split	NA						NA	
Protected Phases	7		7	8	8						6	
Permitted Phases												
Actuated Green, G (s)	4.5		4.5	24.4	24.4						7.6	
Effective Green, g (s)	4.5		4.5	24.4	24.4						7.6	
Actuated g/C Ratio	0.09		0.09	0.49	0.49						0.15	
Clearance Time (s)	4.5		4.5	4.5	4.5						4.5	
Vehicle Extension (s)	3.0		3.0	3.0	3.0						3.0	
Lane Grp Cap (vph)	159		250	863	1671						503	
v/s Ratio Prot	c0.03		0.01	0.02	c0.11						c0.05	
v/s Ratio Perm												
v/c Ratio	0.30		0.13	0.05	0.23						0.30	
Uniform Delay, d1	21.3		20.9	6.7	7.4						18.8	
Progression Factor	1.00		1.00	1.00	1.00						1.00	
Incremental Delay, d2	1.1		0.2	0.1	0.3						0.3	
Delay (s)	22.4		21.2	6.8	7.7						19.2	
Level of Service	C		C	A	A						B	
Approach Delay (s)		21.3			7.6			0.0			19.2	
Approach LOS		C			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	33.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	175	403	65	260	728	0	0	590	188
Future Volume (vph)	0	0	0	175	403	65	260	728	0	0	590	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Lane Util. Factor				1.00	0.95	1.00	1.00	1.00			0.95	0.95
Frpb, ped/bikes				1.00	1.00	0.96	1.00	1.00			1.00	0.97
Flpb, ped/bikes				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt				1.00	1.00	0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95	1.00	1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770	3539	1519	1770	1863			1760	1455
Flt Permitted				0.95	1.00	1.00	0.12	1.00			1.00	1.00
Satd. Flow (perm)				1770	3539	1519	219	1863			1760	1455
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	190	438	71	283	791	0	0	641	204
RTOR Reduction (vph)	0	0	0	0	0	54	0	0	0	0	1	59
Lane Group Flow (vph)	0	0	0	190	438	17	283	791	0	0	660	125
Confl. Peds. (#/hr)	10		11	11		10			11			16
Confl. Bikes (#/hr)			1						2			2
Turn Type				Split	NA	Perm	pm+pt	NA			NA	Perm
Protected Phases				8	8		5	2			6	
Permitted Phases						8	2					6
Actuated Green, G (s)				18.0	18.0	18.0	48.0	48.0			29.0	29.0
Effective Green, g (s)				18.0	18.0	18.0	48.0	48.0			29.0	29.0
Actuated g/C Ratio				0.24	0.24	0.24	0.63	0.63			0.38	0.38
Clearance Time (s)				5.0	5.0	5.0	5.0	5.0			5.0	5.0
Vehicle Extension (s)				3.0	3.0	3.0	4.0	4.0			4.0	4.0
Lane Grp Cap (vph)				419	838	359	424	1176			671	555
v/s Ratio Prot				0.11	c0.12		0.12	c0.42			c0.37	
v/s Ratio Perm						0.01	0.30					0.09
v/c Ratio				0.45	0.52	0.05	0.67	0.67			0.98	0.23
Uniform Delay, d1				24.8	25.3	22.4	23.1	9.0			23.3	15.9
Progression Factor				1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2				3.5	2.3	0.2	4.3	1.7			30.4	0.3
Delay (s)				28.3	27.6	22.6	27.5	10.6			53.7	16.2
Level of Service				C	C	C	C	B			D	B
Approach Delay (s)		0.0			27.3			15.1			45.5	
Approach LOS		A			C			B			D	

Intersection Summary					
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C		
HCM 2000 Volume to Capacity ratio	0.80				
Actuated Cycle Length (s)	76.0	Sum of lost time (s)	15.0		
Intersection Capacity Utilization	76.9%	ICU Level of Service	D		
Analysis Period (min)	15				
c Critical Lane Group					



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	152	0	143	747	313	16	88	343	436	58	23
Future Volume (vph)	19	152	0	143	747	313	16	88	343	436	58	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00	1.00	0.95	0.95	
Frt	1.00	1.00		1.00	1.00	0.85		1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99	1.00	0.95	0.97	
Satd. Flow (prot)	1770	3539		1770	3539	1583		1849	1583	1681	1688	
Flt Permitted	0.25	1.00		0.65	1.00	1.00		0.94	1.00	0.68	0.72	
Satd. Flow (perm)	459	3539		1206	3539	1583		1755	1583	1211	1264	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	165	0	155	812	340	17	96	373	474	63	25
RTOR Reduction (vph)	0	0	0	0	0	216	0	0	201	0	6	0
Lane Group Flow (vph)	21	165	0	155	812	124	0	113	172	275	281	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2		2	6		
Actuated Green, G (s)	20.5	20.5		20.1	20.1	20.1		25.3	25.3	25.3	25.3	
Effective Green, g (s)	20.5	20.5		20.1	20.1	20.1		25.3	25.3	25.3	25.3	
Actuated g/C Ratio	0.37	0.37		0.37	0.37	0.37		0.46	0.46	0.46	0.46	
Clearance Time (s)	4.6	4.6		5.0	5.0	5.0		4.6	4.6	4.6	4.6	
Vehicle Extension (s)	4.0	4.0		3.5	3.5	3.5		4.0	4.0	4.0	4.0	
Lane Grp Cap (vph)	171	1319		440	1293	578		807	728	557	581	
v/s Ratio Prot		0.05			c0.23							
v/s Ratio Perm	0.05			0.13		0.08		0.06	0.11	c0.23	0.22	
v/c Ratio	0.12	0.13		0.35	0.63	0.21		0.14	0.24	0.49	0.48	
Uniform Delay, d1	11.3	11.3		12.7	14.4	12.0		8.6	9.0	10.4	10.3	
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.6	1.0	0.2		0.4	0.8	3.1	2.9	
Delay (s)	11.8	11.4		13.3	15.4	12.2		8.9	9.8	13.5	13.2	
Level of Service	B	B		B	B	B		A	A	B	B	
Approach Delay (s)		11.5			14.3			9.6			13.3	
Approach LOS		B			B			A			B	

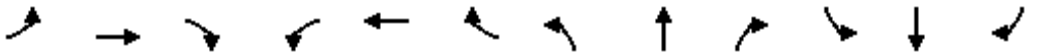
Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	9.6
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	285	15	22	59	23	28
Future Volume (Veh/h)	285	15	22	59	23	28
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	310	16	24	64	25	30
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				238		
pX, platoon unblocked						
vC, conflicting volume			326		430	318
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			326		430	318
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			98		96	96
cM capacity (veh/h)			1234		571	723

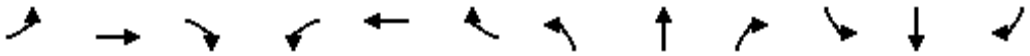
Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	326	88	55
Volume Left	0	24	25
Volume Right	16	0	30
cSH	1700	1234	645
Volume to Capacity	0.19	0.02	0.09
Queue Length 95th (ft)	0	1	7
Control Delay (s)	0.0	2.3	11.1
Lane LOS		A	B
Approach Delay (s)	0.0	2.3	11.1
Approach LOS			B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	315	199	201	0	0	0	83	496	149	159	426	103
Future Volume (vph)	315	199	201	0	0	0	83	496	149	159	426	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Lane Util. Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.94				1.00	1.00	0.98	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85				1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00				0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1863	1493				1770	1863	1552	1770	1863	1516
Flt Permitted	0.95	1.00	1.00				0.50	1.00	1.00	0.21	1.00	1.00
Satd. Flow (perm)	1770	1863	1493				925	1863	1552	392	1863	1516
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	342	216	218	0	0	0	90	539	162	173	463	112
RTOR Reduction (vph)	0	0	144	0	0	0	0	0	87	0	0	55
Lane Group Flow (vph)	342	216	74	0	0	0	90	539	75	173	463	57
Confl. Peds. (#/hr)	13		22	22		13			6			13
Confl. Bikes (#/hr)			1			3			3			2
Turn Type	Split	NA	Perm				Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4						2		1	6	
Permitted Phases			4				2		2	6		6
Actuated Green, G (s)	20.5	20.5	20.5				23.5	23.5	23.5	30.7	30.7	30.7
Effective Green, g (s)	20.5	20.5	20.5				23.5	23.5	23.5	30.7	30.7	30.7
Actuated g/C Ratio	0.34	0.34	0.34				0.39	0.39	0.39	0.51	0.51	0.51
Clearance Time (s)	4.2	4.2	4.2				4.6	4.6	4.6	4.0	4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0				4.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	604	636	510				362	729	607	274	953	775
v/s Ratio Prot	c0.19	0.12						c0.29		0.03	c0.25	
v/s Ratio Perm			0.05				0.10		0.05	0.29		0.04
v/c Ratio	0.57	0.34	0.15				0.25	0.74	0.12	0.63	0.49	0.07
Uniform Delay, d1	16.1	14.7	13.7				12.3	15.6	11.7	10.3	9.5	7.4
Progression Factor	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	1.4	0.6				1.6	6.6	0.4	4.7	1.8	0.2
Delay (s)	19.9	16.2	14.3				13.9	22.3	12.1	15.0	11.3	7.6
Level of Service	B	B	B				B	C	B	B	B	A
Approach Delay (s)		17.3			0.0			19.2			11.6	
Approach LOS		B			A			B			B	

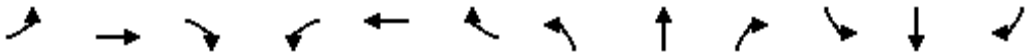
Intersection Summary			
HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	556	37	0	0	0	0	9	37	25	26	0
Future Volume (Veh/h)	14	556	37	0	0	0	0	9	37	25	26	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	604	40	0	0	0	0	10	40	27	28	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		218										
pX, platoon unblocked												
vC, conflicting volume	0			644			668	654	322	377	674	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			644			668	654	322	377	674	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	97	94	95	92	100
cM capacity (veh/h)	1622			937			322	381	674	508	371	1084

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	317	342	50	55
Volume Left	15	0	0	27
Volume Right	0	40	40	0
cSH	1622	1700	584	428
Volume to Capacity	0.01	0.20	0.09	0.13
Queue Length 95th (ft)	1	0	7	11
Control Delay (s)	0.4	0.0	11.7	14.7
Lane LOS	A		B	B
Approach Delay (s)	0.2		11.7	14.7
Approach LOS			B	B

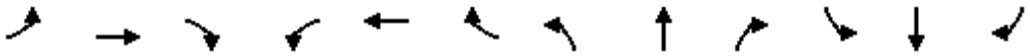
Intersection Summary				
Average Delay	2.0			
Intersection Capacity Utilization	33.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	36	1239	25	0	0	0	0	12	32	57	45	0
Future Volume (vph)	36	1239	25	0	0	0	0	12	32	57	45	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	1347	27	0	0	0	0	13	35	62	49	0

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total (vph)	713	701	48	111
Volume Left (vph)	39	0	0	62
Volume Right (vph)	0	27	35	0
Hadj (s)	0.06	0.01	-0.40	0.15
Departure Headway (s)	5.1	5.0	5.6	6.1
Degree Utilization, x	1.00	0.97	0.08	0.19
Capacity (veh/h)	704	715	630	586
Control Delay (s)	54.7	48.0	9.1	10.4
Approach Delay (s)	51.4		9.1	10.4
Approach LOS	F		A	B

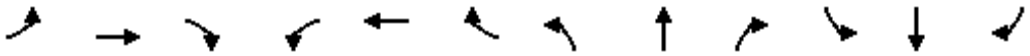
Intersection Summary				
Delay	47.2			
Level of Service	E			
Intersection Capacity Utilization	54.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Stop			Stop			Stop	
Traffic Volume (vph)	286	528	13	43	0	21	0	19	12	0	0	0
Future Volume (vph)	286	528	13	43	0	21	0	19	12	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	311	574	14	47	0	23	0	21	13	0	0	0

Direction, Lane #	EB 1	EB 2	WB 1	NB 1
Volume Total (vph)	311	588	70	34
Volume Left (vph)	311	0	47	0
Volume Right (vph)	0	14	23	13
Hadj (s)	0.53	0.02	-0.03	-0.20
Departure Headway (s)	5.2	4.7	4.8	5.5
Degree Utilization, x	0.45	0.76	0.09	0.05
Capacity (veh/h)	689	759	732	622
Control Delay (s)	11.1	19.8	8.3	8.7
Approach Delay (s)	16.8		8.3	8.7
Approach LOS	C		A	A

Intersection Summary				
Delay	16.0			
Level of Service	C			
Intersection Capacity Utilization	45.6%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	43	0	0	31	19	535	45	22	489	20
Future Volume (Veh/h)	0	0	43	0	0	31	19	535	45	22	489	20
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	47	0	0	34	21	582	49	24	532	22
Pedestrians		7			7							
Lane Width (ft)		12.0			16.0							
Walking Speed (ft/s)		4.0			4.0							
Percent Blockage		1			1							
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								1261			455	
pX, platoon unblocked	0.84	0.84	0.84	0.84	0.84		0.84					
vC, conflicting volume	1256	1278	550	1282	1264	614	561			638		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1209	1236	369	1241	1220	614	382			638		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	92	100	100	93	98			97		
cM capacity (veh/h)	118	139	565	111	142	488	982			938		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	47	34	21	631	24	554
Volume Left	0	0	21	0	24	0
Volume Right	47	34	0	49	0	22
cSH	565	488	982	1700	938	1700
Volume to Capacity	0.08	0.07	0.02	0.37	0.03	0.33
Queue Length 95th (ft)	7	6	2	0	2	0
Control Delay (s)	11.9	12.9	8.7	0.0	8.9	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	11.9	12.9	0.3		0.4	
Approach LOS	B	B				

Intersection Summary				
Average Delay	1.1			
Intersection Capacity Utilization	40.9%	ICU Level of Service		A
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Washington Avenue
E/W Street Name	Washington Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	13	0	64	0	44	10	12	0	41	510	19	0	24	463	54
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	14	0	71	0	49	11	13	0	45	565	21	0	27	513	60
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		85			73			631			600	
Entry Volume veh/h		83			72			619			588	
Circulating Flow (v_c), pc/h	589			624			41			105		
Exiting Flow (v_{ex}), pc/h	48			116			592			633		
Capacity (c_{pce}), pc/h		627			605			1085			1017	
Capacity (c), veh/h		615			594			1063			997	
v/c Ratio (x)		0.14			0.12			0.58			0.59	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.5			7.5			10.9			11.6	
Lane LOS		A			A			B			B	
95% Queue, veh		0.5			0.4			3.9			4.0	
Approach Delay, s/veh	7.5			7.5			10.9			11.6		
Approach LOS	A			A			B			B		
Intersection Delay, s/veh | LOS	10.8						B					

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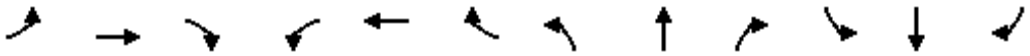
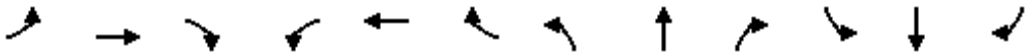


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	46	73	28	87	6	130	4	264	69	154	163	2
Future Volume (vph)	46	73	28	87	6	130	4	264	69	154	163	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	79	30	95	7	141	4	287	75	167	177	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	159	243	366	346
Volume Left (vph)	50	95	4	167
Volume Right (vph)	30	141	75	2
Hadj (s)	-0.02	-0.24	-0.09	0.13
Departure Headway (s)	6.6	6.2	5.8	6.1
Degree Utilization, x	0.29	0.42	0.59	0.58
Capacity (veh/h)	460	508	579	552
Control Delay (s)	12.3	13.5	16.9	17.1
Approach Delay (s)	12.3	13.5	16.9	17.1
Approach LOS	B	B	C	C

Intersection Summary				
Delay	15.6			
Level of Service	C			
Intersection Capacity Utilization	64.4%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	12	314	36	16	218	35	34	55	54	28	73	14
Future Volume (Veh/h)	12	314	36	16	218	35	34	55	54	28	73	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	341	39	17	237	38	37	60	59	30	79	15
Pedestrians		1						7			14	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					265							
pX, platoon unblocked	0.99						0.99	0.99		0.99	0.99	0.99
vC, conflicting volume	289			387			739	716	368	780	717	271
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	271			387			728	705	368	769	705	253
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			86	82	91	87	77	98
cM capacity (veh/h)	1259			1165			259	341	674	237	341	765

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	393	292	156	124
Volume Left	13	17	37	30
Volume Right	39	38	59	15
cSH	1259	1165	384	328
Volume to Capacity	0.01	0.01	0.41	0.38
Queue Length 95th (ft)	1	1	48	43
Control Delay (s)	0.4	0.6	20.7	22.5
Lane LOS	A	A	C	C
Approach Delay (s)	0.4	0.6	20.7	22.5
Approach LOS			C	C

Intersection Summary				
Average Delay	6.6			
Intersection Capacity Utilization	39.8%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information		Site Information	
Analyst		Intersection	Coast Hwy - Wisconsin Avenue
Agency or Co.	IBI Group	E/W Street Name	Wisconsin Avenue
Date Performed	05/23/2016	N/S Street Name	Coast Highway
Analysis Year	2016	Analysis Time Period (hrs)	0.25
Time Analyzed	AM Peak Hour	Peak Hour Factor	0.92
Project Description	35130 - Coast Highway	Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	99	136	174	0	132	110	23	0	153	480	144	0	25	480	49
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	110	151	193	0	146	122	26	0	170	532	160	0	28	532	54
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		454			294			862			614	
Entry Volume veh/h		445			288			845			602	
Circulating Flow (v_c), pc/h	706			812			289			438		
Exiting Flow (v_{ex}), pc/h	339			346			668			871		
Capacity (c_{pce}), pc/h		558			502			846			729	
Capacity (c), veh/h		547			492			830			715	
v/c Ratio (x)		0.81			0.59			1.02			0.84	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		33.3			20.1			58.3			30.0	
Lane LOS		D			C			F			D	
95% Queue, veh		8.0			3.7			18.8			9.5	
Approach Delay, s/veh	33.3			20.1			58.3			30.0		
Approach LOS	D			C			F			D		
Intersection Delay, s/veh | LOS	40.3						E					

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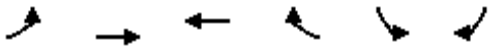
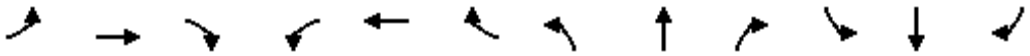


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	503	374	23	34	35
Future Volume (Veh/h)	8	503	374	23	34	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	547	407	25	37	38
Pedestrians		1	1		8	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		266				
pX, platoon unblocked						
vC, conflicting volume	440				994	428
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	440				994	428
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				86	94
cM capacity (veh/h)	1112				268	622

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	556	432	75
Volume Left	9	0	37
Volume Right	0	25	38
cSH	1112	1700	376
Volume to Capacity	0.01	0.25	0.20
Queue Length 95th (ft)	1	0	18
Control Delay (s)	0.2	0.0	16.9
Lane LOS	A		C
Approach Delay (s)	0.2	0.0	16.9
Approach LOS			C

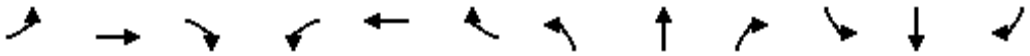
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	43.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	29	522	4	2	348	33	2	1	4	49	0	39
Future Volume (Veh/h)	29	522	4	2	348	33	2	1	4	49	0	39
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	567	4	2	378	36	2	1	4	53	0	42
Pedestrians		2									2	
Lane Width (ft)		12.0									12.0	
Walking Speed (ft/s)		4.0									4.0	
Percent Blockage		0									0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		526										
pX, platoon unblocked												
vC, conflicting volume	416			571			1077	1053	569	1040	1037	400
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	416			571			1077	1053	569	1040	1037	400
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			99	100	99	74	100	94
cM capacity (veh/h)	1141			1002			179	219	522	201	224	648

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	603	416	7	95
Volume Left	32	2	2	53
Volume Right	4	36	4	42
cSH	1141	1002	299	289
Volume to Capacity	0.03	0.00	0.02	0.33
Queue Length 95th (ft)	2	0	2	35
Control Delay (s)	0.8	0.1	17.3	23.4
Lane LOS	A	A	C	C
Approach Delay (s)	0.8	0.1	17.3	23.4
Approach LOS			C	C

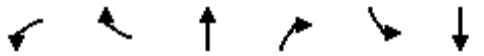
Intersection Summary				
Average Delay	2.5			
Intersection Capacity Utilization	64.8%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	284	303	84	205	0	180	0	117	0	0	0
Future Volume (vph)	0	284	303	84	205	0	180	0	117	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	309	329	91	223	0	196	0	127	0	0	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	638	314	323	0
Volume Left (vph)	0	91	196	0
Volume Right (vph)	329	0	127	0
Hadj (s)	-0.28	0.09	-0.08	0.00
Departure Headway (s)	5.3	6.1	6.3	7.5
Degree Utilization, x	0.94	0.53	0.57	0.00
Capacity (veh/h)	669	576	547	426
Control Delay (s)	44.0	15.9	17.3	10.5
Approach Delay (s)	44.0	15.9	17.3	0.0
Approach LOS	E	C	C	A

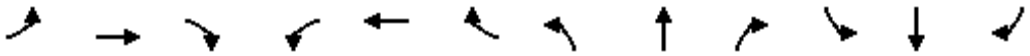
Intersection Summary				
Delay	30.3			
Level of Service	D			
Intersection Capacity Utilization	82.6%	ICU Level of Service	E	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	66	134	195	97	97	189
Future Volume (vph)	66	134	195	97	97	189
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	72	146	212	105	105	205

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	218	317	310
Volume Left (vph)	72	0	105
Volume Right (vph)	146	105	0
Hadj (s)	-0.30	-0.16	0.10
Departure Headway (s)	5.1	4.7	5.0
Degree Utilization, x	0.31	0.42	0.43
Capacity (veh/h)	644	726	688
Control Delay (s)	10.3	11.1	11.7
Approach Delay (s)	10.3	11.1	11.7
Approach LOS	B	B	B

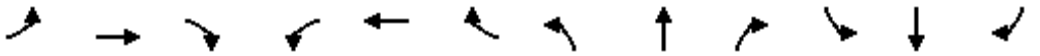
Intersection Summary			
Delay	11.1		
Level of Service	B		
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	365	21	19	302	71	29	42	37	77	26	21
Future Volume (Veh/h)	14	365	21	19	302	71	29	42	37	77	26	21
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	397	23	21	328	77	32	46	40	84	28	23
Pedestrians		4			8			11			3	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			1			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					213							
pX, platoon unblocked	0.88						0.88	0.88		0.88	0.88	0.88
vC, conflicting volume	408			431			899	900	428	921	872	374
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	258			431			816	817	428	841	786	218
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			86	82	94	57	90	97
cM capacity (veh/h)	1146			1118			221	262	617	194	273	718

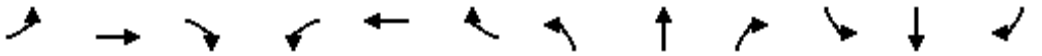
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	435	426	118	135
Volume Left	15	21	32	84
Volume Right	23	77	40	23
cSH	1146	1118	306	238
Volume to Capacity	0.01	0.02	0.39	0.57
Queue Length 95th (ft)	1	1	44	79
Control Delay (s)	0.4	0.6	23.9	38.3
Lane LOS	A	A	C	E
Approach Delay (s)	0.4	0.6	23.9	38.3
Approach LOS			C	E

Intersection Summary				
Average Delay	7.6			
Intersection Capacity Utilization	48.5%	ICU Level of Service	A	
Analysis Period (min)	15			



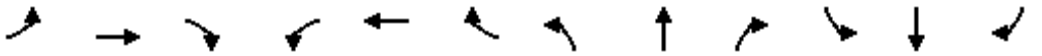
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	210	83	205	204	162	87	447	132	167	380	28
Future Volume (vph)	53	210	83	205	204	162	87	447	132	167	380	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	10	11	11	16	16	16
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844	1537	1681	1762	1794	1652	3290		2006	2090	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1844	1537	1681	1762	1794	1652	3290		2006	2090	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	228	90	223	222	176	95	486	143	182	413	30
RTOR Reduction (vph)	0	0	72	0	0	143	0	35	0	0	3	0
Lane Group Flow (vph)	0	286	18	201	244	33	95	594	0	182	440	0
Confl. Peds. (#/hr)			10	10					3			
Confl. Bikes (#/hr)			4						3			
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		15.6	15.6	15.1	15.1	15.1	6.7	22.4		8.1	23.8	
Effective Green, g (s)		15.6	15.6	15.1	15.1	15.1	6.7	22.4		8.1	23.8	
Actuated g/C Ratio		0.19	0.19	0.19	0.19	0.19	0.08	0.28		0.10	0.30	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		359	299	317	332	338	138	921		203	621	
v/s Ratio Prot		c0.16		0.12	c0.14		0.06	0.18		c0.09	c0.21	
v/s Ratio Perm			0.01			0.02						
v/c Ratio		0.80	0.06	0.63	0.73	0.10	0.69	0.65		0.90	0.71	
Uniform Delay, d1		30.7	26.2	29.9	30.6	26.8	35.6	25.3		35.5	25.0	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		10.9	0.0	4.3	8.5	0.2	10.8	3.5		35.8	6.7	
Delay (s)		41.6	26.3	34.2	39.0	27.0	46.4	28.8		71.3	31.7	
Level of Service		D	C	C	D	C	D	C		E	C	
Approach Delay (s)		37.9			34.0			31.1			43.3	
Approach LOS		D			C			C			D	

Intersection Summary			
HCM 2000 Control Delay	36.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



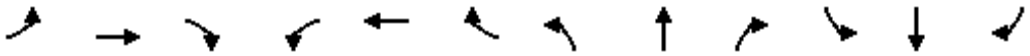
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	620	6	24	689	231	9	20	61	433	16	106
Future Volume (vph)	53	620	6	24	689	231	9	20	61	433	16	106
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	0.95			0.95			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Frt	1.00	1.00		1.00	0.96			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3532		1761	3394			3135			1776	1524
Flt Permitted	0.19	1.00		0.30	1.00			0.91			0.66	1.00
Satd. Flow (perm)	353	3532		549	3394			2879			1228	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	674	7	26	749	251	10	22	66	471	17	115
RTOR Reduction (vph)	0	1	0	0	58	0	0	34	0	0	0	43
Lane Group Flow (vph)	58	680	0	26	942	0	0	64	0	0	488	72
Confl. Peds. (#/hr)			11	11			30		1	1		30
Confl. Bikes (#/hr)			4			4						1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Actuated Green, G (s)	21.1	21.1		21.1	21.1			29.4			29.4	29.4
Effective Green, g (s)	21.1	21.1		21.1	21.1			29.4			29.4	29.4
Actuated g/C Ratio	0.35	0.35		0.35	0.35			0.49			0.49	0.49
Clearance Time (s)	4.5	4.5		4.5	4.5			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.0			4.0	4.0
Lane Grp Cap (vph)	124	1242		193	1193			1410			601	746
v/s Ratio Prot		0.19			c0.28							
v/s Ratio Perm	0.16			0.05				0.02			c0.40	0.05
v/c Ratio	0.47	0.55		0.13	0.79			0.05			0.81	0.10
Uniform Delay, d1	15.1	15.6		13.2	17.5			8.0			13.0	8.2
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	2.8	0.5		0.3	3.6			0.1			11.4	0.3
Delay (s)	17.9	16.1		13.6	21.0			8.0			24.4	8.4
Level of Service	B	B		B	C			A			C	A
Approach Delay (s)		16.2			20.8			8.0			21.3	
Approach LOS		B			C			A			C	

Intersection Summary			
HCM 2000 Control Delay	19.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	73.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	19	15	69	19	237	20	525	127	303	547	19
Future Volume (vph)	43	19	15	69	19	237	20	525	127	303	547	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	10	11	16
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1760			1789	1794	1770	3873		1652	3404	
Flt Permitted		0.77			0.80	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1399			1484	1794	1770	3873		1652	3404	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	47	21	16	75	21	258	22	571	138	329	595	21
RTOR Reduction (vph)	0	13	0	0	0	219	0	27	0	0	2	0
Lane Group Flow (vph)	0	71	0	0	96	39	22	682	0	329	614	0
Confl. Peds. (#/hr)			4	4					3			
Confl. Bikes (#/hr)			1						2			
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		9.0			9.0	9.0	0.6	22.2		14.1	35.7	
Effective Green, g (s)		9.0			9.0	9.0	0.6	22.2		14.1	35.7	
Actuated g/C Ratio		0.15			0.15	0.15	0.01	0.38		0.24	0.61	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		213			226	273	18	1457		394	2059	
v/s Ratio Prot							0.01	c0.18		c0.20	0.18	
v/s Ratio Perm		0.05			c0.06	0.02						
v/c Ratio		0.33			0.42	0.14	1.22	0.47		0.84	0.30	
Uniform Delay, d1		22.3			22.7	21.7	29.2	13.9		21.3	5.6	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			0.5	0.1	289.8	0.2		14.1	0.1	
Delay (s)		22.7			23.1	21.8	319.0	14.2		35.5	5.7	
Level of Service		C			C	C	F	B		D	A	
Approach Delay (s)		22.7			22.1			23.3			16.1	
Approach LOS		C			C			C			B	

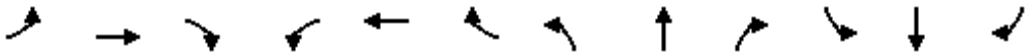
Intersection Summary			
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	59.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	58.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	387	63	68	235	0	139	0	118	0	0	0
Future Volume (Veh/h)	0	387	63	68	235	0	139	0	118	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	421	68	74	255	0	151	0	128	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		252										
pX, platoon unblocked												
vC, conflicting volume	255			489			858	858	455	986	892	255
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	255			489			858	858	455	986	892	255
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			93			42	100	79	100	100	100
cM capacity (veh/h)	1310			1074			262	274	605	169	262	784

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	489	329	279	0
Volume Left	0	74	151	0
Volume Right	68	0	128	0
cSH	1310	1074	355	1700
Volume to Capacity	0.00	0.07	0.79	0.00
Queue Length 95th (ft)	0	6	164	0
Control Delay (s)	0.0	2.5	44.0	0.0
Lane LOS		A	E	A
Approach Delay (s)	0.0	2.5	44.0	0.0
Approach LOS			E	A

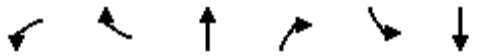
Intersection Summary			
Average Delay	11.9		
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	211	54	0	82	0	54	2	16	0	0	0
Future Volume (Veh/h)	0	211	54	0	82	0	54	2	16	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	229	59	0	89	0	59	2	17	0	0	0
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		643										
pX, platoon unblocked												
vC, conflicting volume	89			288			348	348	258	366	377	89
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	89			288			348	348	258	366	377	89
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			90	100	98	100	100	100
cM capacity (veh/h)	1506			1274			607	576	780	576	555	969

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	288	89	78	0
Volume Left	0	0	59	0
Volume Right	59	0	17	0
cSH	1506	1274	637	1700
Volume to Capacity	0.00	0.00	0.12	0.00
Queue Length 95th (ft)	0	0	10	0
Control Delay (s)	0.0	0.0	11.4	0.0
Lane LOS			B	A
Approach Delay (s)	0.0	0.0	11.4	0.0
Approach LOS			B	A

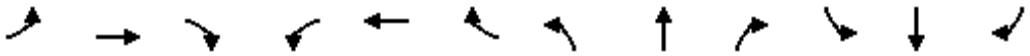
Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	25.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	66	261	21	38	311	21
Future Volume (vph)	66	261	21	38	311	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	72	284	23	41	338	23

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	356	64	361
Volume Left (vph)	72	0	338
Volume Right (vph)	284	41	0
Hadj (s)	-0.40	-0.35	0.22
Departure Headway (s)	4.6	4.9	5.1
Degree Utilization, x	0.45	0.09	0.51
Capacity (veh/h)	737	658	674
Control Delay (s)	11.4	8.4	13.3
Approach Delay (s)	11.4	8.4	13.3
Approach LOS	B	A	B

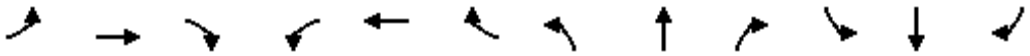
Intersection Summary			
Delay	12.0		
Level of Service	B		
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	165	160	21	129	22	217	28	28	6	20	34
Future Volume (Veh/h)	13	165	160	21	129	22	217	28	28	6	20	34
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	179	174	23	140	24	236	30	30	7	22	37
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					576							
pX, platoon unblocked												
vC, conflicting volume	164			353			540	504	266	537	579	152
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	164			353			540	504	266	537	579	152
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			42	93	96	98	95	96
cM capacity (veh/h)	1414			1206			407	457	773	406	414	894

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	367	187	296	66
Volume Left	14	23	236	7
Volume Right	174	24	30	37
cSH	1414	1206	433	591
Volume to Capacity	0.01	0.02	0.68	0.11
Queue Length 95th (ft)	1	1	126	9
Control Delay (s)	0.4	1.1	29.5	11.9
Lane LOS	A	A	D	B
Approach Delay (s)	0.4	1.1	29.5	11.9
Approach LOS			D	B

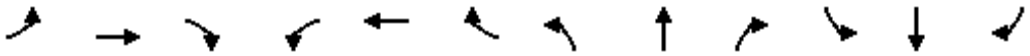
Intersection Summary				
Average Delay	10.8			
Intersection Capacity Utilization	49.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	110	14	42	92	15	8	12	39	7	5	2
Future Volume (Veh/h)	2	110	14	42	92	15	8	12	39	7	5	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	120	15	46	100	16	9	13	42	8	5	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					249							
pX, platoon unblocked												
vC, conflicting volume	116			135			336	340	128	380	339	108
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	116			135			336	340	128	380	339	108
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			97			98	98	95	98	99	100
cM capacity (veh/h)	1473			1449			597	563	923	528	563	946

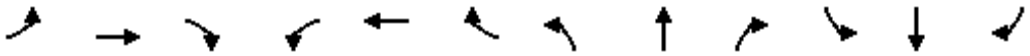
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	137	162	64	15
Volume Left	2	46	9	8
Volume Right	15	16	42	2
cSH	1473	1449	765	574
Volume to Capacity	0.00	0.03	0.08	0.03
Queue Length 95th (ft)	0	2	7	2
Control Delay (s)	0.1	2.3	10.1	11.4
Lane LOS	A	A	B	B
Approach Delay (s)	0.1	2.3	10.1	11.4
Approach LOS			B	B

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	28.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	80	56	94	46	19	62	413	61	77	327	22
Future Volume (vph)	83	80	56	94	46	19	62	413	61	77	327	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	0.95		1.00	0.95	
Frt		0.97			0.98		1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1765			1780		1770	3471		1770	3506	
Flt Permitted		0.84			0.70		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1513			1290		1770	3471		1770	3506	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	90	87	61	102	50	21	67	449	66	84	355	24
RTOR Reduction (vph)	0	19	0	0	8	0	0	17	0	0	6	0
Lane Group Flow (vph)	0	219	0	0	165	0	67	498	0	84	373	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		10.3			9.9		5.4	17.6		3.8	15.8	
Effective Green, g (s)		10.3			9.9		5.4	17.6		3.8	15.8	
Actuated g/C Ratio		0.23			0.22		0.12	0.39		0.08	0.35	
Clearance Time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		344			281		210	1348		148	1222	
v/s Ratio Prot							0.04	c0.14		c0.05	0.11	
v/s Ratio Perm		c0.14			0.13							
v/c Ratio		0.64			0.59		0.32	0.37		0.57	0.31	
Uniform Delay, d1		15.8			15.9		18.3	9.9		20.0	10.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		3.8			3.3		0.3	0.2		4.9	0.1	
Delay (s)		19.6			19.2		18.6	10.1		24.9	10.9	
Level of Service		B			B		B	B		C	B	
Approach Delay (s)		19.6			19.2			11.0			13.4	
Approach LOS		B			B			B			B	

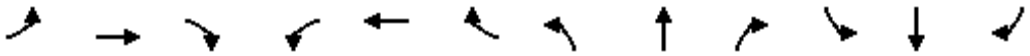
Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	45.3	Sum of lost time (s)	14.2
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	211	80	79	95	27	92	119	36	42	46	48
Future Volume (Veh/h)	48	211	80	79	95	27	92	119	36	42	46	48
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	229	87	86	103	29	100	129	39	46	50	52
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		280										
pX, platoon unblocked												
vC, conflicting volume	132			316			743	680	272	770	710	118
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	132			316			743	680	272	770	710	118
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			93			61	61	95	76	84	94
cM capacity (veh/h)	1453			1244			254	335	766	196	322	934

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	368	218	268	148
Volume Left	52	86	100	46
Volume Right	87	29	39	52
cSH	1453	1244	323	332
Volume to Capacity	0.04	0.07	0.83	0.45
Queue Length 95th (ft)	3	6	179	55
Control Delay (s)	1.4	3.6	52.8	24.3
Lane LOS	A	A	F	C
Approach Delay (s)	1.4	3.6	52.8	24.3
Approach LOS			F	C

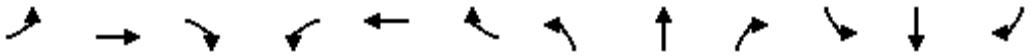
Intersection Summary				
Average Delay	19.0			
Intersection Capacity Utilization	50.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	113	31	37	53	3	41	52	37	4	22	7
Future Volume (vph)	10	113	31	37	53	3	41	52	37	4	22	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	123	34	40	58	3	45	57	40	4	24	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	168	101	142	36
Volume Left (vph)	11	40	45	4
Volume Right (vph)	34	3	40	8
Hadj (s)	-0.07	0.10	-0.07	-0.08
Departure Headway (s)	4.4	4.6	4.5	4.6
Degree Utilization, x	0.20	0.13	0.18	0.05
Capacity (veh/h)	789	736	754	717
Control Delay (s)	8.5	8.3	8.5	7.8
Approach Delay (s)	8.5	8.3	8.5	7.8
Approach LOS	A	A	A	A

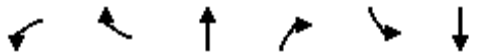
Intersection Summary				
Delay	8.4			
Level of Service	A			
Intersection Capacity Utilization	37.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	22	167	14	73	72	49	14	119	164	94	25	5
Future Volume (vph)	22	167	14	73	72	49	14	119	164	94	25	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	182	15	79	78	53	15	129	178	102	27	5

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	221	210	322	134
Volume Left (vph)	24	79	15	102
Volume Right (vph)	15	53	178	5
Hadj (s)	0.01	-0.04	-0.29	0.16
Departure Headway (s)	5.5	5.5	5.1	5.8
Degree Utilization, x	0.34	0.32	0.45	0.22
Capacity (veh/h)	596	598	658	552
Control Delay (s)	11.3	11.1	12.2	10.4
Approach Delay (s)	11.3	11.1	12.2	10.4
Approach LOS	B	B	B	B

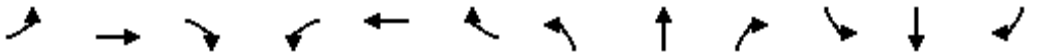
Intersection Summary				
Delay	11.4			
Level of Service	B			
Intersection Capacity Utilization	58.9%	ICU Level of Service	B	
Analysis Period (min)	15			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Yield		Stop			Yield
Traffic Volume (vph)	0	168	156	11	111	59
Future Volume (vph)	0	168	156	11	111	59
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	183	170	12	121	64

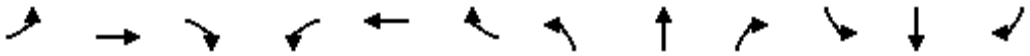
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total (vph)	183	182	185
Volume Left (vph)	0	0	121
Volume Right (vph)	183	12	0
Hadj (s)	-0.57	-0.01	0.16
Departure Headway (s)	4.2	4.5	4.7
Degree Utilization, x	0.21	0.23	0.24
Capacity (veh/h)	792	757	729
Control Delay (s)	8.3	8.9	9.2
Approach Delay (s)	8.3	8.9	9.2
Approach LOS	A	A	A

Intersection Summary			
Delay	8.8		
Level of Service	A		
Intersection Capacity Utilization	25.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	25	165	55	228	131	390	61	751	302	326	631	30
Future Volume (vph)	25	165	55	228	131	390	61	751	302	326	631	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1556		1805	1794	1770	3793		2006	3983	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1556		1805	1794	1770	3793		2006	3983	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	27	179	60	248	142	424	66	816	328	354	686	33
RTOR Reduction (vph)	0	0	53	0	0	189	0	39	0	0	3	0
Lane Group Flow (vph)	27	179	7	0	390	235	66	1105	0	354	716	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	12.6	12.6	12.6		24.1	43.9	7.0	31.0		19.8	43.8	
Effective Green, g (s)	12.6	12.6	12.6		24.1	43.9	7.0	31.0		19.8	43.8	
Actuated g/C Ratio	0.12	0.12	0.12		0.23	0.41	0.07	0.29		0.19	0.41	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	237	220	183		408	738	116	1103		372	1636	
v/s Ratio Prot	0.01	c0.10			c0.22	0.13	0.04	c0.29		c0.18	0.18	
v/s Ratio Perm			0.00									
v/c Ratio	0.11	0.81	0.04		0.96	0.32	0.57	1.00		0.95	0.44	
Uniform Delay, d1	42.0	45.9	41.6		40.7	21.2	48.3	37.8		42.9	22.6	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	19.1	0.0		33.0	0.2	3.8	27.5		34.1	0.9	
Delay (s)	42.1	65.0	41.7		73.7	21.5	52.1	65.3		77.0	23.4	
Level of Service	D	E	D		E	C	D	E		E	C	
Approach Delay (s)		57.4			46.5			64.6			41.1	
Approach LOS		E			D			E			D	

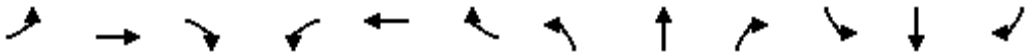
Intersection Summary			
HCM 2000 Control Delay	52.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	106.6	Sum of lost time (s)	19.1
Intersection Capacity Utilization	92.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	720	33	44	692	78	22	0	44	36	15	82
Future Volume (Veh/h)	14	720	33	44	692	78	22	0	44	36	15	82
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	783	36	48	752	85	24	0	48	39	16	89
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			TWLTL							
Median storage veh)					2							
Upstream signal (ft)		312										
pX, platoon unblocked				0.91			0.91	0.91	0.91	0.91	0.91	
vC, conflicting volume	837			819			1818	1764	801	1770	1740	794
vC1, stage 1 conf vol							831	831		890	890	
vC2, stage 2 conf vol							988	933		879	849	
vCu, unblocked vol	837			751			1850	1790	732	1796	1763	794
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			94			85	100	87	80	93	77
cM capacity (veh/h)	797			781			165	239	383	191	234	388

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	834	885	72	144
Volume Left	15	48	24	39
Volume Right	36	85	48	89
cSH	797	781	266	287
Volume to Capacity	0.02	0.06	0.27	0.50
Queue Length 95th (ft)	1	5	27	66
Control Delay (s)	0.5	1.7	23.5	29.5
Lane LOS	A	A	C	D
Approach Delay (s)	0.5	1.7	23.5	29.5
Approach LOS			C	D

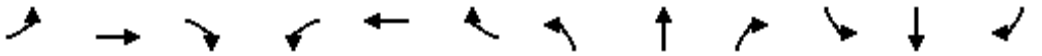
Intersection Summary				
Average Delay	4.1			
Intersection Capacity Utilization	81.4%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	974	25	61	958	93	5	4	96	37	4	23
Future Volume (Veh/h)	14	974	25	61	958	93	5	4	96	37	4	23
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	1059	27	66	1041	101	5	4	104	40	4	25
Pedestrians		1						1				
Lane Width (ft)		12.0						12.0				
Walking Speed (ft/s)		4.0						4.0				
Percent Blockage		0						0				
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)		687										
pX, platoon unblocked				0.93			0.93	0.93	0.93	0.93	0.93	
vC, conflicting volume	1142			1087			2304	2378	1074	2418	2340	1092
vC1, stage 1 conf vol							1104	1104		1224	1224	
vC2, stage 2 conf vol							1201	1274		1195	1117	
vCu, unblocked vol	1142			1055			2366	2445	1041	2489	2405	1092
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			89			96	97	60	28	97	90
cM capacity (veh/h)	612			612			131	155	259	55	145	260

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	15	1086	66	1142	113	69
Volume Left	15	0	66	0	5	40
Volume Right	0	27	0	101	104	25
cSH	612	1700	612	1700	243	82
Volume to Capacity	0.02	0.64	0.11	0.67	0.47	0.85
Queue Length 95th (ft)	2	0	9	0	57	109
Control Delay (s)	11.0	0.0	11.6	0.0	32.1	148.8
Lane LOS	B		B		D	F
Approach Delay (s)	0.2		0.6		32.1	148.8
Approach LOS					D	F

Intersection Summary				
Average Delay	6.0			
Intersection Capacity Utilization	73.1%	ICU Level of Service	D	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	15	1123	0	0	1155	387	0	0	0	0	0	26
Future Volume (Veh/h)	15	1123	0	0	1155	387	0	0	0	0	0	26
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	1221	0	0	1255	421	0	0	0	0	0	28
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1676			1221			2536	2929	1221	2718	2718	1466
vC1, stage 1 conf vol							1253	1253		1466	1466	
vC2, stage 2 conf vol							1283	1676		1253	1253	
vCu, unblocked vol	1676			1221			2536	2929	1221	2718	2718	1466
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)							6.1	5.5		6.1	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			100			100	100	100	100	100	82
cM capacity (veh/h)	382			571			116	113	219	120	143	157

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	16	1221	0	1676	0	28
Volume Left	16	0	0	0	0	0
Volume Right	0	0	0	421	0	28
cSH	382	1700	1700	1700	1700	157
Volume to Capacity	0.04	0.72	0.00	0.99	0.00	0.18
Queue Length 95th (ft)	3	0	0	0	0	16
Control Delay (s)	14.8	0.0	0.0	0.0	0.0	32.8
Lane LOS	B				A	D
Approach Delay (s)	0.2		0.0		0.0	32.8
Approach LOS					A	D

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	94.3%	ICU Level of Service	F	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	106	0	0	104	111	867	23	104	695	10
Future Volume (Veh/h)	0	0	106	0	0	104	111	867	23	104	695	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	115	0	0	113	121	942	25	113	755	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)											621	
pX, platoon unblocked												
vC, conflicting volume	1812	2196	760	2292	2188	484	766			967		
vC1, stage 1 conf vol	986	986		1196	1196							
vC2, stage 2 conf vol	826	1209		1096	992							
vCu, unblocked vol	1812	2196	760	2292	2188	484	766			967		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	67	100	100	79	86			84		
cM capacity (veh/h)	100	97	348	11	124	529	843			708		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	115	113	121	628	339	113	766
Volume Left	0	0	121	0	0	113	0
Volume Right	115	113	0	0	25	0	11
cSH	348	529	843	1700	1700	708	1700
Volume to Capacity	0.33	0.21	0.14	0.37	0.20	0.16	0.45
Queue Length 95th (ft)	35	20	12	0	0	14	0
Control Delay (s)	20.4	13.6	10.0	0.0	0.0	11.0	0.0
Lane LOS	C	B	A			B	
Approach Delay (s)	20.4	13.6	1.1			1.4	
Approach LOS	C	B					

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	50.4%	ICU Level of Service	A	
Analysis Period (min)	15			

HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - Michigan Avenue
E/W Street Name	Michigan Avenue
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	199	92	83	0	53	12	26	0	27	538	45	0	19	538	50
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	221	102	92	0	59	13	29	0	30	596	50	0	21	596	55
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		415			101			676			672	
Entry Volume veh/h		407			99			663			659	
Circulating Flow (v_c), pc/h	676			847			344			102		
Exiting Flow (v_{ex}), pc/h	173			98			846			747		
Capacity (c_{pce}), pc/h		575			484			801			1020	
Capacity (c), veh/h		564			475			785			1000	
v/c Ratio (x)		0.72			0.21			0.84			0.66	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		24.8			10.6			28.2			13.5	
Lane LOS		C			B			D			B	
95% Queue, veh		6.0			0.8			9.9			5.2	
Approach Delay, s/veh	24.8			10.6			28.2			13.5		
Approach LOS	C			B			D			B		
Intersection Delay, s/veh | LOS	21.2						C					

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HCS7 Roundabouts Report

General Information

Analyst	
Agency or Co.	IBI Group
Date Performed	05/23/2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Project Description	35130 - Coast Highway

Site Information

Intersection	Coast Hwy - West
E/W Street Name	West Street
N/S Street Name	Coast Highway
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.92
Jurisdiction	

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	33	20	16	0	28	20	61	0	16	191	28	0	61	191	33
Percent Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Flow Rate (v_{PCE}), pc/h	0	37	22	18	0	31	22	68	0	18	212	31	0	68	212	37
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		5.1929			5.1929			5.1929			5.1929	
Follow-Up Headway (s)		3.1858			3.1858			3.1858			3.1858	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		77			121			261			317	
Entry Volume veh/h		75			119			256			311	
Circulating Flow (v_c), pc/h	311			267			127			71		
Exiting Flow (v_{ex}), pc/h	121			77			317			261		
Capacity (c_{pce}), pc/h		828			865			995			1053	
Capacity (c), veh/h		812			848			976			1032	
v/c Ratio (x)		0.09			0.14			0.26			0.30	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.4			5.6			6.3			6.5	
Lane LOS		A			A			A			A	
95% Queue, veh		0.3			0.5			1.1			1.3	
Approach Delay, s/veh	5.4			5.6			6.3			6.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.2						A					

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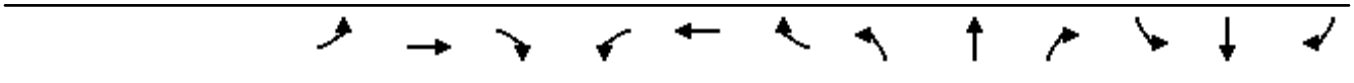
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	17	38	51	21	31	44	28	156	21	37	132	48
Future Volume (Veh/h)	17	38	51	21	31	44	28	156	21	37	132	48
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	18	41	55	23	34	48	30	170	23	40	143	52
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)								737			527	
pX, platoon unblocked												
vC, conflicting volume	459	502	98	468	516	96	195			193		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	459	502	98	468	516	96	195			193		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	91	94	94	92	95	98			97		
cM capacity (veh/h)	417	446	940	402	438	941	1375			1378		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	114	105	115	108	112	124
Volume Left	18	23	30	0	40	0
Volume Right	55	48	0	23	0	52
cSH	589	565	1375	1700	1378	1700
Volume to Capacity	0.19	0.19	0.02	0.06	0.03	0.07
Queue Length 95th (ft)	18	17	2	0	2	0
Control Delay (s)	12.6	12.8	2.1	0.0	2.9	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.6	12.8	1.1		1.4	
Approach LOS	B	B				

Intersection Summary				
Average Delay	4.9			
Intersection Capacity Utilization	Err%	ICU Level of Service		H
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	102	0	14	13	1056	13	24	2206	16
Future Volume (veh/h)	0	0	0	102	0	14	13	1056	13	24	2206	16
Number				3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh				0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)				1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln				1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h				111	0	0	14	1148	0	26	2398	0
Adj No. of Lanes				2	0	1	1	3	1	1	2	1
Peak Hour Factor				0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %				2	2	2	2	2	2	2	2	2
Cap, veh/h				738	0	329	92	3173	988	92	2208	988
Arrive On Green				0.20	0.00	0.00	0.05	0.60	0.00	0.05	0.60	0.00
Sat Flow, veh/h				3690	0	1647	1845	5289	1647	1845	3681	1647
Grp Volume(v), veh/h				111	0	0	14	1148	0	26	2398	0
Grp Sat Flow(s),veh/h/ln				1845	0	1647	1845	1763	1647	1845	1840	1647
Q Serve(g_s), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Cycle Q Clear(g_c), s				2.0	0.0	0.0	0.6	8.9	0.0	1.1	48.0	0.0
Prop In Lane				1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h				738	0	329	92	3173	988	92	2208	988
V/C Ratio(X)				0.15	0.00	0.00	0.15	0.36	0.00	0.28	1.09	0.00
Avail Cap(c_a), veh/h				738	0	329	92	3173	988	92	2208	988
HCM Platoon Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)				1.00	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh				26.4	0.0	0.0	36.4	8.2	0.0	36.6	16.0	0.0
Incr Delay (d2), s/veh				0.4	0.0	0.0	3.5	0.3	0.0	7.5	47.1	0.0
Initial Q Delay(d3),s/veh				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln				1.0	0.0	0.0	0.4	4.3	0.0	0.7	38.4	0.0
LnGrp Delay(d),s/veh				26.8	0.0	0.0	39.8	8.5	0.0	44.1	63.1	0.0
LnGrp LOS				C			D	A		D	F	
Approach Vol, veh/h					111			1162			2424	
Approach Delay, s/veh					26.8			8.9			62.9	
Approach LOS					C			A			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2			5	6		8
Phs Duration (G+Y+Rc), s	8.0	52.0			8.0	52.0		20.0
Change Period (Y+Rc), s	4.0	4.0			4.0	4.0		4.0
Max Green Setting (Gmax), s	4.0	48.0			4.0	48.0		16.0
Max Q Clear Time (g_c+I1), s	3.1	10.9			2.6	50.0		4.0
Green Ext Time (p_c), s	0.0	10.5			0.0	0.0		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	44.8
HCM 2010 LOS	D

Notes

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1122	212	304	1286	0	0
Future Volume (veh/h)	1122	212	304	1286	0	0
Number	4	14	3	8		
Initial Q (Qb), veh	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937		
Adj Flow Rate, veh/h	1220	230	330	1398		
Adj No. of Lanes	2	1	2	2		
Peak Hour Factor	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2		
Cap, veh/h	2116	947	805	3313		
Arrive On Green	0.57	0.57	0.22	0.90		
Sat Flow, veh/h	3778	1647	3579	3778		
Grp Volume(v), veh/h	1220	230	330	1398		
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840		
Q Serve(g_s), s	8.4	2.8	3.1	2.4		
Cycle Q Clear(g_c), s	8.4	2.8	3.1	2.4		
Prop In Lane		1.00	1.00			
Lane Grp Cap(c), veh/h	2116	947	805	3313		
V/C Ratio(X)	0.58	0.24	0.41	0.42		
Avail Cap(c_a), veh/h	2116	947	805	3313		
HCM Platoon Ratio	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	5.4	4.2	13.2	0.3		
Incr Delay (d2), s/veh	1.2	0.6	1.5	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.4	1.4	1.7	1.2		
LnGrp Delay(d),s/veh	6.6	4.8	14.8	0.7		
LnGrp LOS	A	A	B	A		
Approach Vol, veh/h	1450			1728		
Approach Delay, s/veh	6.3			3.4		
Approach LOS	A			A		

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4				8
Phs Duration (G+Y+Rc), s			13.0	27.0				40.0
Change Period (Y+Rc), s			4.0	4.0				4.0
Max Green Setting (Gmax), s			9.0	23.0				36.0
Max Q Clear Time (g_c+I1), s			5.1	10.4				4.4
Green Ext Time (p_c), s			0.4	7.5				13.7

Intersection Summary	
HCM 2010 Ctrl Delay	4.7
HCM 2010 LOS	A



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	1520	97	283	1157	155	0
Future Volume (veh/h)	1520	97	283	1157	155	0
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	1652	105	308	1258	168	0
Adj No. of Lanes	2	1	2	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1595	714	298	2147	523	467
Arrive On Green	0.43	0.43	0.08	0.58	0.28	0.00
Sat Flow, veh/h	3778	1647	3579	3778	1845	1647
Grp Volume(v), veh/h	1652	105	308	1258	168	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1840	1845	1647
Q Serve(g_s), s	26.0	2.3	5.0	13.0	4.3	0.0
Cycle Q Clear(g_c), s	26.0	2.3	5.0	13.0	4.3	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1595	714	298	2147	523	467
V/C Ratio(X)	1.04	0.15	1.03	0.59	0.32	0.00
Avail Cap(c_a), veh/h	1595	714	298	2147	523	467
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	17.0	10.3	27.5	7.9	17.0	0.0
Incr Delay (d2), s/veh	32.3	0.4	60.8	1.2	1.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	20.2	1.1	5.0	6.8	2.4	0.0
LnGrp Delay(d),s/veh	49.3	10.7	88.3	9.1	18.6	0.0
LnGrp LOS	F	B	F	A	B	
Approach Vol, veh/h	1757			1566	168	
Approach Delay, s/veh	47.0			24.7	18.6	
Approach LOS	D			C	B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		21.0	9.0	30.0				39.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		17.0	5.0	26.0				35.0
Max Q Clear Time (g_c+I1), s		6.3	7.0	28.0				15.0
Green Ext Time (p_c), s		0.3	0.0	0.0				9.6

Intersection Summary	
HCM 2010 Ctrl Delay	35.6
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	644	6	84	599	98	5	0	32	70	8	48
Future Volume (veh/h)	0	644	6	84	599	98	5	0	32	70	8	48
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1937	1976	1937	1937	1937	1937	0	1937	1937	1937	1937
Adj Flow Rate, veh/h	0	700	7	91	651	0	5	0	35	82	0	52
Adj No. of Lanes	0	2	0	1	2	1	1	0	1	2	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	2	2	0	2	2	2	2
Cap, veh/h	0	1245	12	217	1949	872	0	0	0	1158	0	517
Arrive On Green	0.00	0.33	0.33	0.12	0.53	0.00	0.00	0.00	0.00	0.31	0.00	0.31
Sat Flow, veh/h	0	3831	37	1845	3681	1647		0		3690	0	1647
Grp Volume(v), veh/h	0	345	362	91	651	0		0.0		82	0	52
Grp Sat Flow(s),veh/h/ln	0	1840	1931	1845	1840	1647				1845	0	1647
Q Serve(g_s), s	0.0	7.8	7.8	2.3	5.2	0.0				0.8	0.0	1.1
Cycle Q Clear(g_c), s	0.0	7.8	7.8	2.3	5.2	0.0				0.8	0.0	1.1
Prop In Lane	0.00		0.02	1.00		1.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	613	644	217	1949	872				1158	0	517
V/C Ratio(X)	0.00	0.56	0.56	0.42	0.33	0.00				0.07	0.00	0.10
Avail Cap(c_a), veh/h	0	613	644	217	1949	872				1158	0	517
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	13.9	13.9	20.9	6.9	0.0				12.3	0.0	12.4
Incr Delay (d2), s/veh	0.0	3.7	3.5	5.9	0.5	0.0				0.1	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.6	4.8	1.5	2.7	0.0				0.4	0.0	0.6
LnGrp Delay(d),s/veh	0.0	17.6	17.5	26.7	7.3	0.0				12.4	0.0	12.8
LnGrp LOS		B	B	C	A					B		B
Approach Vol, veh/h		707			742						134	
Approach Delay, s/veh		17.6			9.7						12.6	
Approach LOS		B			A						B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			10.0	21.0		20.0		31.0
Change Period (Y+Rc), s			4.0	4.0		4.0		4.0
Max Green Setting (Gmax), s			6.0	17.0		16.0		27.0
Max Q Clear Time (g_c+I1), s			4.3	9.8		3.1		7.2
Green Ext Time (p_c), s			0.0	2.5		0.3		4.4

Intersection Summary	
HCM 2010 Ctrl Delay	13.5
HCM 2010 LOS	B

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	181	731	10	28	1073	277	9	2	15	271	6	74
Future Volume (veh/h)	181	731	10	28	1073	277	9	2	15	271	6	74
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1976	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	197	795	11	30	1166	301	10	2	16	191	153	80
Adj No. of Lanes	1	2	0	1	2	1	0	1	1	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	185	1255	17	115	1104	494	310	62	329	369	240	125
Arrive On Green	0.10	0.34	0.34	0.06	0.30	0.30	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1845	3717	51	1845	3681	1647	1550	310	1647	1845	1199	627
Grp Volume(v), veh/h	197	394	412	30	1166	301	12	0	16	191	0	233
Grp Sat Flow(s),veh/h/ln	1845	1840	1928	1845	1840	1647	1860	0	1647	1845	0	1827
Q Serve(g_s), s	8.0	14.4	14.4	1.2	24.0	12.5	0.4	0.0	0.6	7.4	0.0	9.4
Cycle Q Clear(g_c), s	8.0	14.4	14.4	1.2	24.0	12.5	0.4	0.0	0.6	7.4	0.0	9.4
Prop In Lane	1.00		0.03	1.00		1.00	0.83		1.00	1.00		0.34
Lane Grp Cap(c), veh/h	185	621	651	115	1104	494	372	0	329	369	0	365
V/C Ratio(X)	1.07	0.63	0.63	0.26	1.06	0.61	0.03	0.00	0.05	0.52	0.00	0.64
Avail Cap(c_a), veh/h	185	621	651	115	1104	494	372	0	329	369	0	365
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.0	22.3	22.3	35.7	28.0	24.0	25.8	0.0	25.9	28.6	0.0	29.3
Incr Delay (d2), s/veh	85.4	4.9	4.7	5.4	43.1	5.5	0.2	0.0	0.3	5.1	0.0	8.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.4	8.2	8.5	0.8	18.7	6.4	0.2	0.0	0.3	4.3	0.0	5.6
LnGrp Delay(d),s/veh	121.4	27.2	27.0	41.1	71.1	29.5	25.9	0.0	26.1	33.7	0.0	37.6
LnGrp LOS	F	C	C	D	F	C	C		C	C		D
Approach Vol, veh/h		1003			1497			28			424	
Approach Delay, s/veh		45.6			62.2			26.0			35.8	
Approach LOS		D			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	31.0		20.0	12.0	28.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	27.0		16.0	8.0	24.0
Max Q Clear Time (g_c+I1), s		2.6	3.2	16.4		11.4	10.0	26.0
Green Ext Time (p_c), s		0.0	0.0	3.7		0.9	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	52.4
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	870	282	87	766	169	359	97	140	400	235	371
Future Volume (veh/h)	58	870	282	87	766	169	359	97	140	400	235	371
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1976	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	63	946	307	95	833	184	248	304	152	345	381	403
Adj No. of Lanes	1	2	0	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	115	890	287	92	1150	515	415	436	370	369	387	329
Arrive On Green	0.06	0.32	0.32	0.05	0.31	0.31	0.22	0.22	0.22	0.20	0.20	0.20
Sat Flow, veh/h	1845	2737	884	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	63	635	618	95	833	184	248	304	152	345	381	403
Grp Sat Flow(s),veh/h/ln	1845	1840	1781	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.7	26.0	26.0	4.0	16.1	6.9	9.6	11.5	6.3	14.7	15.7	16.0
Cycle Q Clear(g_c), s	2.7	26.0	26.0	4.0	16.1	6.9	9.6	11.5	6.3	14.7	15.7	16.0
Prop In Lane	1.00		0.50	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	115	598	579	92	1150	515	415	436	371	369	387	329
V/C Ratio(X)	0.55	1.06	1.07	1.03	0.72	0.36	0.60	0.70	0.41	0.93	0.98	1.22
Avail Cap(c_a), veh/h	115	598	579	92	1150	515	415	436	371	369	387	329
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.4	27.0	27.0	38.0	24.4	21.3	27.8	28.5	26.5	31.5	31.9	32.0
Incr Delay (d2), s/veh	17.3	54.1	56.9	102.0	4.0	1.9	6.2	8.9	3.3	33.0	41.7	124.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	22.1	21.9	4.6	8.7	3.4	5.6	7.2	3.2	10.9	12.9	18.6
LnGrp Delay(d),s/veh	53.7	81.1	83.9	140.5	28.4	23.2	34.0	37.4	29.8	64.5	73.6	156.8
LnGrp LOS	D	F	F	F	C	C	C	D	C	E	E	F
Approach Vol, veh/h		1316			1112			704			1129	
Approach Delay, s/veh		81.1			37.1			34.6			100.5	
Approach LOS		F			D			C			F	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		22.0	8.0	30.0		20.0	9.0	29.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		18.0	4.0	26.0		16.0	5.0	25.0
Max Q Clear Time (g_c+I1), s		13.5	6.0	28.0		18.0	4.7	18.1
Green Ext Time (p_c), s		1.4	0.0	0.0		0.0	0.0	3.5

Intersection Summary	
HCM 2010 Ctrl Delay	67.1
HCM 2010 LOS	E

Notes

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	24	81	6	6	89	9	4	2	7	0	0	0
Future Vol, veh/h	24	81	6	6	89	9	4	2	7	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	26	88	7	7	97	10	4	2	8	0	0	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	0	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	
Opposing Lanes	1	1	0
Conflicting Approach Left		NB	EB
Conflicting Lanes Left	0	1	1
Conflicting Approach Right	NB		WB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.7	7.6	7.2
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1
Vol Left, %	31%	22%	6%
Vol Thru, %	15%	73%	86%
Vol Right, %	54%	5%	9%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	13	111	104
LT Vol	4	24	6
Through Vol	2	81	89
RT Vol	7	6	9
Lane Flow Rate	14	121	113
Geometry Grp	1	1	1
Degree of Util (X)	0.016	0.136	0.126
Departure Headway (Hd)	4.172	4.054	4.009
Convergence, Y/N	Yes	Yes	Yes
Cap	863	883	893
Service Time	2.172	2.082	2.039
HCM Lane V/C Ratio	0.016	0.137	0.127
HCM Control Delay	7.2	7.7	7.6
HCM Lane LOS	A	A	A
HCM 95th-tile Q	0	0.5	0.4

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↱		↰						↰	↱
Traffic Vol, veh/h	0	179	54	28	32	0	0	0	0	26	0	44
Future Vol, veh/h	0	179	54	28	32	0	0	0	0	26	0	44
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	Yield
Storage Length	-	-	200	-	-	-	-	-	-	-	-	85
Veh in Median Storage, #	-	0	-	-	0	-	-	-	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	195	59	30	35	0	0	0	0	28	0	48

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	-	0	0	195	0	0			290	290	35
Stage 1	-	-	-	-	-	-			95	95	-
Stage 2	-	-	-	-	-	-			195	195	-
Critical Hdwy	-	-	-	4.12	-	-			6.42	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-			5.42	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.42	5.52	-
Follow-up Hdwy	-	-	-	2.218	-	-			3.518	4.018	3.318
Pot Cap-1 Maneuver	0	-	-	1378	-	0			701	620	1038
Stage 1	0	-	-	-	-	0			929	816	-
Stage 2	0	-	-	-	-	0			838	739	-
Platoon blocked, %		-	-		-						
Mov Cap-1 Maneuver	-	-	-	1378	-	-			686	0	1038
Mov Cap-2 Maneuver	-	-	-	-	-	-			686	0	-
Stage 1	-	-	-	-	-	-			909	0	-
Stage 2	-	-	-	-	-	-			838	0	-

Approach	EB	WB	SB
HCM Control Delay, s	0	3.6	9.3
HCM LOS			A

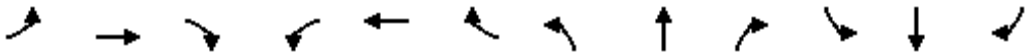
Minor Lane/Major Mvmt	EBT	EBR	WBL	WBT	SBLn1	SBLn2
Capacity (veh/h)	-	-	1378	-	686	1038
HCM Lane V/C Ratio	-	-	0.022	-	0.041	0.046
HCM Control Delay (s)	-	-	7.7	0	10.5	8.6
HCM Lane LOS	-	-	A	A	B	A
HCM 95th %tile Q(veh)	-	-	0.1	-	0.1	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	716	99	165	1236	40	252
Future Volume (veh/h)	716	99	165	1236	40	252
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	778	0	179	1343	43	0
Adj No. of Lanes	2	1	2	1	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1963	878	334	1317	394	618
Arrive On Green	0.53	0.00	0.09	0.68	0.21	0.00
Sat Flow, veh/h	3778	1647	3579	1937	1845	2898
Grp Volume(v), veh/h	778	0	179	1343	43	0
Grp Sat Flow(s),veh/h/ln	1840	1647	1790	1937	1845	1449
Q Serve(g_s), s	9.4	0.0	3.6	51.0	1.4	0.0
Cycle Q Clear(g_c), s	9.4	0.0	3.6	51.0	1.4	0.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1963	878	334	1317	394	618
V/C Ratio(X)	0.40	0.00	0.54	1.02	0.11	0.00
Avail Cap(c_a), veh/h	1963	878	334	1317	394	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	10.4	0.0	32.4	12.0	23.8	0.0
Incr Delay (d2), s/veh	0.6	0.0	6.0	29.8	0.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.9	0.0	2.0	37.3	0.8	0.0
LnGrp Delay(d),s/veh	11.0	0.0	38.5	41.8	24.3	0.0
LnGrp LOS	B		D	F	C	
Approach Vol, veh/h	778			1522	43	
Approach Delay, s/veh	11.0			41.4	24.3	
Approach LOS	B			D	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		20.0	11.0	44.0				55.0
Change Period (Y+Rc), s		4.0	4.0	4.0				4.0
Max Green Setting (Gmax), s		16.0	7.0	40.0				51.0
Max Q Clear Time (g_c+I1), s		3.4	5.6	11.4				53.0
Green Ext Time (p_c), s		0.0	0.1	6.1				0.0

Intersection Summary	
HCM 2010 Ctrl Delay	31.0
HCM 2010 LOS	C

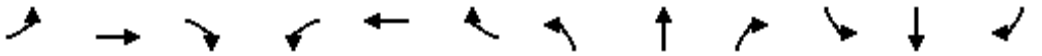
Appendix N – Analysis Output Sheets (Mitigation - Existing)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	160	60	263	155	235	63	618	169	242	525	21
Future Volume (vph)	40	160	60	263	155	235	63	618	169	242	525	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	0.93	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844	1532	1681	1746	1478	1770	3412		1770	1847	
Flt Permitted		0.99	1.00	0.95	0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1844	1532	1681	1746	1478	1770	3412		1770	1847	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	174	65	286	168	255	68	672	184	263	571	23
RTOR Reduction (vph)	0	0	55	0	0	210	0	27	0	0	2	0
Lane Group Flow (vph)	0	217	10	223	231	45	68	829	0	263	592	0
Confl. Peds. (#/hr)	14		10	10		14			3			15
Confl. Bikes (#/hr)			4			5			3			3
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		14.4	14.4	15.9	15.9	15.9	5.8	25.2		15.7	35.1	
Effective Green, g (s)		14.4	14.4	15.9	15.9	15.9	5.8	25.2		15.7	35.1	
Actuated g/C Ratio		0.16	0.16	0.18	0.18	0.18	0.06	0.28		0.17	0.39	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.5		2.0	3.5	
Lane Grp Cap (vph)		295	245	296	308	261	114	955		308	720	
v/s Ratio Prot		c0.12		c0.13	0.13		0.04	0.24		c0.15	c0.32	
v/s Ratio Perm			0.01			0.03						
v/c Ratio		0.74	0.04	0.75	0.75	0.17	0.60	0.87		0.85	0.82	
Uniform Delay, d1		36.0	32.0	35.2	35.2	31.5	41.0	30.8		36.0	24.7	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.0	0.0	10.7	10.1	0.4	5.5	10.6		19.3	10.3	
Delay (s)		43.9	32.0	45.9	45.3	31.8	46.4	41.4		55.3	34.9	
Level of Service		D	C	D	D	C	D	D		E	C	
Approach Delay (s)		41.2			40.6			41.8			41.2	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	41.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

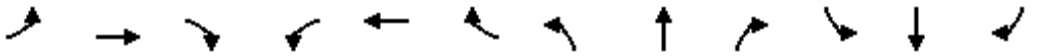


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	118	106	51	68	23	117	696	74	92	552	41
Future Volume (vph)	53	118	106	51	68	23	117	696	74	92	552	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.95			0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1750			1790		1770	1836		1770	1843	
Flt Permitted		0.92			0.71		0.95	1.00		0.29	1.00	
Satd. Flow (perm)		1625			1295		1770	1836		532	1843	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	58	128	115	55	74	25	127	757	80	100	600	45
RTOR Reduction (vph)	0	27	0	0	8	0	0	5	0	0	3	0
Lane Group Flow (vph)	0	274	0	0	146	0	127	832	0	100	642	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8						6		
Actuated Green, G (s)		15.5			15.1		7.5	39.2		27.5	27.5	
Effective Green, g (s)		15.5			15.1		7.5	39.2		27.5	27.5	
Actuated g/C Ratio		0.24			0.23		0.12	0.61		0.43	0.43	
Clearance Time (s)		4.6			5.0		4.2	5.0		5.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		391			304		206	1119		227	788	
v/s Ratio Prot							0.07	c0.45			c0.35	
v/s Ratio Perm		c0.17			0.11					0.19		
v/c Ratio		0.70			0.48		0.62	0.74		0.44	0.81	
Uniform Delay, d1		22.3			21.2		27.0	9.0		13.0	16.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.4			1.4		3.8	2.7		1.4	6.5	
Delay (s)		27.7			22.6		30.9	11.7		14.3	22.7	
Level of Service		C			C		C	B		B	C	
Approach Delay (s)		27.7			22.6			14.2			21.5	
Approach LOS		C			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	64.3	Sum of lost time (s)	14.2
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

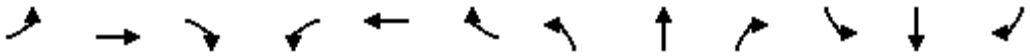
c Critical Lane Group

Appendix O.1 – Analysis Output Sheets (Mitigation - Future with Project Build Out SR-78)



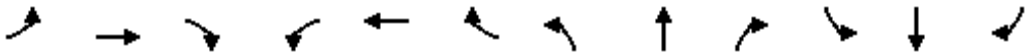
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	251	80	104	17	70	42	73	731	26	67	739	181
Future Volume (vph)	251	80	104	17	70	42	73	731	26	67	739	181
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1795	1583		1769		1770	1853		1770	1863	1583
Flt Permitted		0.70	1.00		0.95		0.14	1.00		0.13	1.00	1.00
Satd. Flow (perm)		1304	1583		1685		256	1853		249	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	273	87	113	18	76	46	79	795	28	73	803	197
RTOR Reduction (vph)	0	0	72	0	29	0	0	2	0	0	0	91
Lane Group Flow (vph)	0	360	41	0	111	0	79	821	0	73	803	106
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		21.7	21.7		21.7		31.1	31.1		32.3	32.3	32.3
Effective Green, g (s)		21.7	21.7		21.7		31.1	31.1		32.3	32.3	32.3
Actuated g/C Ratio		0.36	0.36		0.36		0.52	0.52		0.54	0.54	0.54
Clearance Time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		7.0	7.0	7.0
Lane Grp Cap (vph)		471	572		609		132	960		134	1002	852
v/s Ratio Prot								c0.44			0.43	
v/s Ratio Perm		c0.28	0.03		0.07		0.31			0.29		0.07
v/c Ratio		0.76	0.07		0.18		0.60	0.86		0.54	0.80	0.12
Uniform Delay, d1		16.9	12.5		13.1		10.1	12.5		9.0	11.2	6.9
Progression Factor		1.00	1.00		1.00		1.03	0.95		1.00	1.00	1.00
Incremental Delay, d2		10.0	0.2		0.5		16.4	8.6		15.0	6.7	0.3
Delay (s)		26.9	12.7		13.6		26.7	20.4		24.0	18.0	7.2
Level of Service		C	B		B		C	C		C	B	A
Approach Delay (s)		23.5			13.6			21.0			16.4	
Approach LOS		C			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Future Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		1.00						0.90			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		3524						1682			1813	
Flt Permitted		1.00						1.00			0.84	
Satd. Flow (perm)		3524						1682			1569	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	1388	28	0	0	0	0	14	36	64	52	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	1455	0	0	0	0	0	31	0	0	116	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		25.5						16.5			16.5	
Effective Green, g (s)		25.5						16.5			16.5	
Actuated g/C Ratio		0.51						0.33			0.33	
Clearance Time (s)		4.0						4.0			4.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		1797						555			517	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.41									c0.07	
v/c Ratio		0.81						0.06			0.22	
Uniform Delay, d1		10.2						11.4			12.1	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		2.8						0.2			1.0	
Delay (s)		13.0						11.6			13.1	
Level of Service		B						B			B	
Approach Delay (s)		13.0			0.0			11.6			13.1	
Approach LOS		B			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



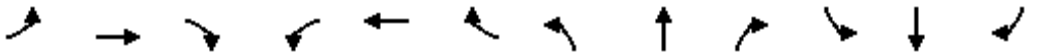
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	375	22	20	310	69	30	42	40	75	26	21
Future Volume (vph)	14	375	22	20	310	69	30	42	40	75	26	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	408	24	22	337	75	33	46	43	82	28	23

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	447	434	122	133
Volume Left (vph)	15	22	33	82
Volume Right (vph)	24	75	43	23
Hadj (s)	0.01	-0.06	-0.12	0.05
Departure Headway (s)	5.5	5.4	6.5	6.6
Degree Utilization, x	0.68	0.65	0.22	0.24
Capacity (veh/h)	447	635	459	453
Control Delay (s)	19.2	18.0	11.3	11.7
Approach Delay (s)	19.2	18.0	11.3	11.7
Approach LOS	C	C	B	B

Intersection Summary				
Delay	17.0			
Level of Service	C			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			

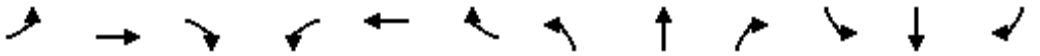
HCM Signalized Intersection Capacity Analysis
27: Coast Hwy & Oceanside Blvd

2/21/2017



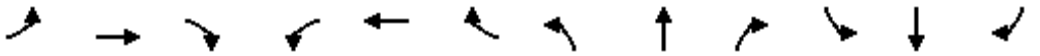
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	230	90	252	223	211	94	577	162	217	490	30
Future Volume (vph)	58	230	90	252	223	211	94	577	162	217	490	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	10	11	11	16	16	16
Total Lost time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes		1.00	0.97	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	0.99	
Flt Protected		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1844	1534	1681	1761	1794	1652	3295		2006	2093	
Flt Permitted		0.99	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1844	1534	1681	1761	1794	1652	3295		2006	2093	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	63	250	98	274	242	229	102	627	176	236	533	33
RTOR Reduction (vph)	0	0	79	0	0	187	0	28	0	0	3	0
Lane Group Flow (vph)	0	313	19	247	269	42	102	775	0	236	563	0
Confl. Peds. (#/hr)			10	10					3			
Confl. Bikes (#/hr)			4						3			
Turn Type	Split	NA	Perm	Split	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)		17.4	17.4	16.4	16.4	16.4	6.8	25.6		11.8	30.6	
Effective Green, g (s)		17.4	17.4	16.4	16.4	16.4	6.8	25.6		11.8	30.6	
Actuated g/C Ratio		0.19	0.19	0.18	0.18	0.18	0.08	0.28		0.13	0.34	
Clearance Time (s)		4.6	4.6	5.0	5.0	5.0	4.2	5.0		4.2	5.0	
Vehicle Extension (s)		2.0	2.0	3.5	3.5	3.5	2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		356	296	306	320	326	124	937		263	711	
v/s Ratio Prot		c0.17		0.15	c0.15		0.06	c0.24		0.12	c0.27	
v/s Ratio Perm			0.01			0.02						
v/c Ratio		0.88	0.06	0.81	0.84	0.13	0.82	0.83		0.90	0.79	
Uniform Delay, d1		35.3	29.6	35.3	35.5	30.8	41.0	30.1		38.5	26.8	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		20.5	0.0	14.7	18.1	0.2	32.4	8.3		29.9	8.8	
Delay (s)		55.8	29.7	50.0	53.6	31.0	73.4	38.4		68.4	35.7	
Level of Service		E	C	D	D	C	E	D		E	D	
Approach Delay (s)		49.5			45.5			42.4			45.3	
Approach LOS		D			D			D			D	

Intersection Summary					
HCM 2000 Control Delay	45.0	HCM 2000 Level of Service	D		
HCM 2000 Volume to Capacity ratio	0.86				
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.8		
Intersection Capacity Utilization	77.0%	ICU Level of Service	D		
Analysis Period (min)	15				
c Critical Lane Group					



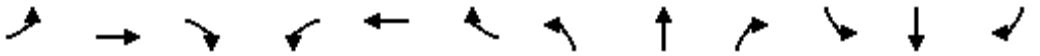
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	15	15	50	15	167	20	737	91	213	768	18
Future Volume (vph)	40	15	15	50	15	167	20	737	91	213	768	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	10	11	16
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1747			1785	1794	1770	2070		1652	1794	
Flt Permitted		0.78			0.80	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1408			1478	1794	1770	2070		1652	1794	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	16	16	54	16	182	22	801	99	232	835	20
RTOR Reduction (vph)	0	12	0	0	0	161	0	4	0	0	1	0
Lane Group Flow (vph)	0	63	0	0	70	21	22	896	0	232	854	0
Confl. Peds. (#/hr)			4	4					3			
Confl. Bikes (#/hr)			1						2			
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		8.7			8.7	8.7	1.4	41.7		12.9	53.2	
Effective Green, g (s)		8.7			8.7	8.7	1.4	41.7		12.9	53.2	
Actuated g/C Ratio		0.11			0.11	0.11	0.02	0.54		0.17	0.69	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		159			166	202	32	1121		276	1239	
v/s Ratio Prot							0.01	c0.43		c0.14	0.48	
v/s Ratio Perm		0.04			c0.05	0.01						
v/c Ratio		0.39			0.42	0.10	0.69	0.80		0.84	0.69	
Uniform Delay, d1		31.7			31.8	30.6	37.6	14.3		31.1	7.0	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.6			0.6	0.1	47.1	4.1		20.0	1.6	
Delay (s)		32.3			32.4	30.7	84.7	18.3		51.1	8.6	
Level of Service		C			C	C	F	B		D	A	
Approach Delay (s)		32.3			31.2			19.9			17.7	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	77.0	Sum of lost time (s)	13.7
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



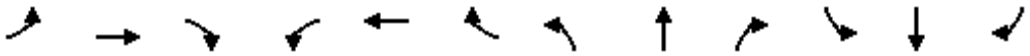
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	133	122	68	76	24	134	719	78	97	571	47
Future Volume (vph)	116	133	122	68	76	24	134	719	78	97	571	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.96			0.98		1.00	0.99		1.00	0.99	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1753			1791		1770	1835		1770	1842	
Flt Permitted		0.81			0.63		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1443			1159		1770	1835		1770	1842	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	145	133	74	83	26	146	782	85	105	621	51
RTOR Reduction (vph)	0	20	0	0	7	0	0	4	0	0	3	0
Lane Group Flow (vph)	0	384	0	0	176	0	146	863	0	105	669	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		24.4			24.0		18.8	46.0		6.0	33.0	
Effective Green, g (s)		24.4			24.0		18.8	46.0		6.0	33.0	
Actuated g/C Ratio		0.27			0.27		0.21	0.51		0.07	0.37	
Clearance Time (s)		4.6			5.0		4.2	5.0		4.0	5.0	
Vehicle Extension (s)		3.0			3.5		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		391			309		369	937		118	675	
v/s Ratio Prot							0.08	c0.47		0.06	c0.36	
v/s Ratio Perm		c0.27			0.15							
v/c Ratio		0.98			0.57		0.40	0.92		0.89	0.99	
Uniform Delay, d1		32.6			28.5		30.7	20.3		41.7	28.4	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		40.7			2.7		0.3	15.5		49.7	32.5	
Delay (s)		73.3			31.3		31.0	35.8		91.4	60.8	
Level of Service		E			C		C	D		F	E	
Approach Delay (s)		73.3			31.3			35.1			65.0	
Approach LOS		E			C			D			E	

Intersection Summary			
HCM 2000 Control Delay	51.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.2
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	147	48	216	117	369	54	691	286	309	581	26
Future Volume (vph)	22	147	48	216	117	369	54	691	286	309	581	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	5.0	5.0	5.0		4.9	4.9	4.2	5.0		4.2	5.0	
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00	1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85	1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1863	1557		1804	1794	1770	3792		2006	2098	
Flt Permitted	0.95	1.00	1.00		0.97	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	2006	1863	1557		1804	1794	1770	3792		2006	2098	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	24	160	52	235	127	401	59	751	311	336	632	28
RTOR Reduction (vph)	0	0	46	0	0	242	0	49	0	0	2	0
Lane Group Flow (vph)	24	160	6	0	362	159	59	1013	0	336	658	0
Confl. Peds. (#/hr)			2	2					5			
Confl. Bikes (#/hr)									4			
Turn Type	Split	NA	Perm	Split	NA	pt+ov	Prot	NA		Prot	NA	
Protected Phases	4	4		8	8	8 1	5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	10.0	10.0	10.0		19.2	33.0	3.0	21.2		13.8	32.0	
Effective Green, g (s)	10.0	10.0	10.0		19.2	33.0	3.0	21.2		13.8	32.0	
Actuated g/C Ratio	0.12	0.12	0.12		0.23	0.40	0.04	0.25		0.17	0.38	
Clearance Time (s)	5.0	5.0	5.0		4.9		4.2	5.0		4.2	5.0	
Vehicle Extension (s)	0.5	0.5	0.5		3.0		2.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	240	223	186		415	710	63	965		332	805	
v/s Ratio Prot	0.01	c0.09			c0.20	0.09	0.03	c0.27		c0.17	0.31	
v/s Ratio Perm			0.00									
v/c Ratio	0.10	0.72	0.03		0.87	0.22	0.94	1.05		1.01	0.82	
Uniform Delay, d1	32.6	35.3	32.4		30.9	16.7	40.1	31.0		34.8	23.0	
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	8.8	0.0		17.9	0.2	89.3	42.8		52.5	6.5	
Delay (s)	32.7	44.1	32.4		48.8	16.8	129.3	73.9		87.2	29.5	
Level of Service	C	D	C		D	B	F	E		F	C	
Approach Delay (s)		40.4			32.0			76.8			49.0	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM 2000 Control Delay	54.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	83.3	Sum of lost time (s)	19.1
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1116	26	61	1097	61	5	4	97	24	4	15
Future Volume (vph)	9	1116	26	61	1097	61	5	4	97	24	4	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.88			0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	1856		1770	1848			1627			1726	
Flt Permitted	0.10	1.00		0.11	1.00			0.99			0.71	
Satd. Flow (perm)	188	1856		203	1848			1608			1267	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	1213	28	66	1192	66	5	4	105	26	4	16
RTOR Reduction (vph)	0	1	0	0	2	0	0	94	0	0	14	0
Lane Group Flow (vph)	10	1240	0	66	1256	0	0	20	0	0	32	0
Confl. Peds. (#/hr)			1	1			1					
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	55.4	55.4		55.4	55.4			7.4			7.4	
Effective Green, g (s)	55.4	55.4		55.4	55.4			7.4			7.4	
Actuated g/C Ratio	0.78	0.78		0.78	0.78			0.10			0.10	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	147	1452		158	1446			168			132	
v/s Ratio Prot		0.67			c0.68							
v/s Ratio Perm	0.05			0.32				0.01			c0.03	
v/c Ratio	0.07	0.85		0.42	0.87			0.12			0.24	
Uniform Delay, d1	1.8	5.1		2.5	5.2			28.7			29.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.2	5.1		1.8	5.8			0.3			0.9	
Delay (s)	2.0	10.2		4.3	11.1			29.1			30.1	
Level of Service	A	B		A	B			C			C	
Approach Delay (s)		10.1			10.7			29.1			30.1	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	894	400	132	894	400	422	443	376	422	443	376
Arrive On Green	0.07	0.24	0.24	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.0	7.0	12.6	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.0	7.0	12.6	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.48	0.79	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.6	22.7	24.8	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	1.8	14.7	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	3.7	7.3	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	51.7	24.5	39.5	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	C	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		33.0			43.4			27.3			30.9	
Approach LOS		C			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	14.6		11.8	5.0	17.8
Green Ext Time (p_c), s		1.3	0.0	1.0		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	35.2
HCM 2010 LOS	D

Notes

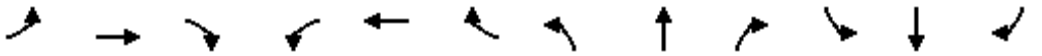
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	916	284	88	807	170	361	96	141	403	234	374
Future Volume (veh/h)	58	916	284	88	807	170	361	96	141	403	234	374
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	63	996	309	96	877	185	248	306	153	346	383	407
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	946	423	105	946	423	422	443	376	422	443	376
Arrive On Green	0.06	0.26	0.26	0.06	0.26	0.26	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	63	996	309	96	877	185	248	306	153	346	383	407
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.3	18.0	12.0	3.6	16.3	6.6	8.4	10.1	5.5	12.5	13.3	16.0
Cycle Q Clear(g_c), s	2.3	18.0	12.0	3.6	16.3	6.6	8.4	10.1	5.5	12.5	13.3	16.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	946	423	105	946	423	422	443	376	422	443	376
V/C Ratio(X)	0.60	1.05	0.73	0.91	0.93	0.44	0.59	0.69	0.41	0.82	0.86	1.08
Avail Cap(c_a), veh/h	105	946	423	105	946	423	422	443	376	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.2	26.0	23.8	32.8	25.4	21.8	24.1	24.7	23.0	25.6	26.0	27.0
Incr Delay (d2), s/veh	22.5	44.0	10.6	65.9	16.1	3.3	5.9	8.6	3.2	16.2	19.7	69.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	14.9	6.6	3.8	10.3	3.4	5.0	6.4	2.8	8.2	9.5	14.5
LnGrp Delay(d),s/veh	54.8	70.0	34.3	98.7	41.5	25.0	30.0	33.3	26.2	41.9	45.6	96.9
LnGrp LOS	D	F	C	F	D	C	C	C	C	D	D	F
Approach Vol, veh/h		1368			1158			707			1136	
Approach Delay, s/veh		61.2			43.6			30.6			62.9	
Approach LOS		E			D			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	8.0	22.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		12.1	5.6	20.0		18.0	4.3	18.3
Green Ext Time (p_c), s		1.2	0.0	0.0		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	52.0
HCM 2010 LOS	D

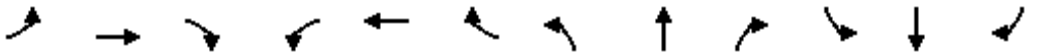
Notes

Appendix O.2 – Analysis Output Sheets (Mitigation - Future with Project Existing SR-78)



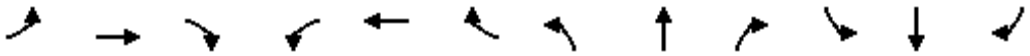
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	245	81	102	17	71	43	72	721	27	69	729	177
Future Volume (vph)	245	81	102	17	71	43	72	721	27	69	729	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	0.95	0.95
Frt		1.00	0.85		0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.96	1.00		0.99		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1795	1583		1768		1770	1853		1770	1763	1504
Flt Permitted		0.70	1.00		0.95		0.13	1.00		0.14	1.00	1.00
Satd. Flow (perm)		1302	1583		1686		239	1853		266	1763	1504
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	88	111	18	77	47	78	784	29	75	792	192
RTOR Reduction (vph)	0	0	71	0	30	0	0	2	0	0	1	80
Lane Group Flow (vph)	0	354	40	0	112	0	78	811	0	75	810	93
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)		21.6	21.6		21.6		31.2	31.2		32.4	32.4	32.4
Effective Green, g (s)		21.6	21.6		21.6		31.2	31.2		32.4	32.4	32.4
Actuated g/C Ratio		0.36	0.36		0.36		0.52	0.52		0.54	0.54	0.54
Clearance Time (s)		3.0	3.0		3.0		4.2	4.2		3.0	3.0	3.0
Vehicle Extension (s)		7.0	7.0		7.0		3.0	3.0		7.0	7.0	7.0
Lane Grp Cap (vph)		468	569		606		124	963		143	952	812
v/s Ratio Prot								0.44			c0.46	
v/s Ratio Perm		c0.27	0.03		0.07		0.33			0.28		0.06
v/c Ratio		0.76	0.07		0.18		0.63	0.84		0.52	0.85	0.12
Uniform Delay, d1		16.9	12.6		13.2		10.3	12.3		8.9	11.7	6.8
Progression Factor		1.00	1.00		1.00		0.89	0.85		1.00	1.00	1.00
Incremental Delay, d2		9.8	0.2		0.5		19.5	7.9		13.1	9.4	0.3
Delay (s)		26.6	12.8		13.7		28.6	18.4		21.9	21.2	7.1
Level of Service		C	B		B		C	B		C	C	A
Approach Delay (s)		23.3			13.7			19.3			18.9	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	19.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	7.2
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



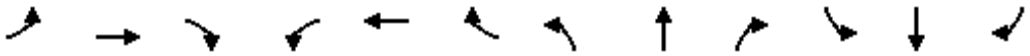
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	27	79	4	27	10	60	810	9	5	810	136
Future Volume (vph)	72	27	79	4	27	10	60	810	9	5	810	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	12	16	16	12	12	16	16	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.97		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.96		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1719	1810		1770	2024		1770	1860		2006	1812	
Flt Permitted	0.73	1.00		0.68	1.00		0.18	1.00		0.25	1.00	
Satd. Flow (perm)	1323	1810		1272	2024		336	1860		522	1812	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	29	86	4	29	11	65	880	10	5	880	148
RTOR Reduction (vph)	0	75	0	0	10	0	0	1	0	0	7	0
Lane Group Flow (vph)	78	40	0	4	30	0	65	889	0	5	1021	0
Confl. Peds. (#/hr)	16		11				10					10
Confl. Bikes (#/hr)			2									1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.8	7.8		7.8	7.8		44.2	44.2		44.2	44.2	
Effective Green, g (s)	7.8	7.8		7.8	7.8		44.2	44.2		44.2	44.2	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.74	0.74		0.74	0.74	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	171	235		165	263		247	1370		384	1334	
v/s Ratio Prot		0.02			0.02			0.48			c0.56	
v/s Ratio Perm	c0.06			0.00			0.19			0.01		
v/c Ratio	0.46	0.17		0.02	0.12		0.26	0.65		0.01	0.77	
Uniform Delay, d1	24.1	23.2		22.8	23.1		2.6	4.0		2.1	4.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.83	0.73	
Incremental Delay, d2	1.9	0.3		0.1	0.2		2.6	2.4		0.1	3.9	
Delay (s)	26.1	23.6		22.8	23.3		5.2	6.4		1.8	7.4	
Level of Service	C	C		C	C		A	A		A	A	
Approach Delay (s)		24.6			23.2			6.3			7.3	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Future Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		1.00						0.90			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		3523						1685			1814	
Flt Permitted		1.00						1.00			0.85	
Satd. Flow (perm)		3523						1685			1589	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	1248	26	0	0	0	0	14	34	61	53	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	1311	0	0	0	0	0	30	0	0	114	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		20.7						16.3			16.3	
Effective Green, g (s)		20.7						16.3			16.3	
Actuated g/C Ratio		0.46						0.36			0.36	
Clearance Time (s)		4.0						4.0			4.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		1620						610			575	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.37									c0.07	
v/c Ratio		0.81						0.05			0.20	
Uniform Delay, d1		10.5						9.3			9.9	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		3.1						0.1			0.8	
Delay (s)		13.5						9.5			10.6	
Level of Service		B						A			B	
Approach Delay (s)		13.5			0.0			9.5			10.6	
Approach LOS		B			A			A			B	

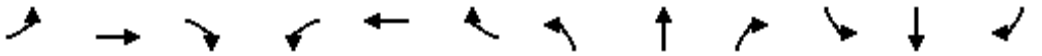
Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	15	358	21	20	296	77	29	46	38	84	28	23
Future Volume (vph)	15	358	21	20	296	77	29	46	38	84	28	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	389	23	22	322	84	32	50	41	91	30	25

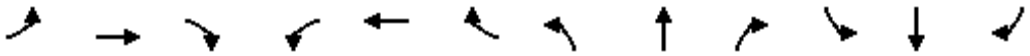
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	428	428	123	146
Volume Left (vph)	16	22	32	91
Volume Right (vph)	23	84	41	25
Hadj (s)	0.01	-0.07	-0.11	0.06
Departure Headway (s)	5.5	5.4	6.5	6.6
Degree Utilization, x	0.65	0.65	0.22	0.27
Capacity (veh/h)	625	636	460	459
Control Delay (s)	18.3	17.8	11.3	11.9
Approach Delay (s)	18.3	17.8	11.3	11.9
Approach LOS	C	C	B	B

Intersection Summary				
Delay	16.5			
Level of Service	C			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	16	15	56	16	190	20	846	103	243	881	19
Future Volume (vph)	42	16	15	56	16	190	20	846	103	243	881	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	10	11	16
Total Lost time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			0.99	1.00	1.00	1.00		1.00	1.00	
Frt		0.97			1.00	0.85	1.00	0.98		1.00	1.00	
Flt Protected		0.97			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1749			1783	1794	1770	2070		1652	1795	
Flt Permitted		0.78			0.76	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1398			1411	1794	1770	2070		1652	1795	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	17	16	61	17	207	22	920	112	264	958	21
RTOR Reduction (vph)	0	11	0	0	0	185	0	4	0	0	1	0
Lane Group Flow (vph)	0	68	0	0	78	22	22	1028	0	264	978	0
Confl. Peds. (#/hr)			4	4					3			
Confl. Bikes (#/hr)			1						2			
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		9.5			9.5	9.5	1.5	51.1		15.8	65.4	
Effective Green, g (s)		9.5			9.5	9.5	1.5	51.1		15.8	65.4	
Actuated g/C Ratio		0.11			0.11	0.11	0.02	0.57		0.18	0.73	
Clearance Time (s)		4.6			4.6	4.6	4.2	4.9		4.2	4.9	
Vehicle Extension (s)		2.0			2.0	2.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		147			148	189	29	1173		289	1302	
v/s Ratio Prot							0.01	c0.50		c0.16	0.55	
v/s Ratio Perm		0.05			c0.06	0.01						
v/c Ratio		0.46			0.53	0.12	0.76	0.88		0.91	0.75	
Uniform Delay, d1		37.9			38.2	36.5	44.1	16.8		36.5	7.4	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.8			1.6	0.1	71.7	7.6		31.2	2.5	
Delay (s)		38.8			39.7	36.6	115.8	24.4		67.7	9.9	
Level of Service		D			D	D	F	C		E	A	
Approach Delay (s)		38.8			37.5			26.3			22.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	25.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	90.1	Sum of lost time (s)	13.7
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	152	129	125	88	31	142	817	99	123	648	50
Future Volume (vph)	135	152	129	125	88	31	142	817	99	123	648	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.96			0.98		1.00	0.98		1.00	0.99	
Flt Protected		0.98			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1756			1785		1770	1832		1770	1843	
Flt Permitted		0.78			0.53		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1392			978		1770	1832		1770	1843	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	147	165	140	136	96	34	154	888	108	134	704	54
RTOR Reduction (vph)	0	13	0	0	4	0	0	4	0	0	3	0
Lane Group Flow (vph)	0	439	0	0	262	0	154	992	0	134	755	0
Turn Type	Perm	NA		Perm	NA		Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		35.0			35.0		13.3	64.0		9.0	59.7	
Effective Green, g (s)		35.0			35.0		13.3	64.0		9.0	59.7	
Actuated g/C Ratio		0.29			0.29		0.11	0.53		0.08	0.50	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		406			285		196	977		132	916	
v/s Ratio Prot							c0.09	c0.54		c0.08	0.41	
v/s Ratio Perm		c0.31			0.27							
v/c Ratio		1.08			0.92		0.79	1.02		1.02	0.82	
Uniform Delay, d1		42.5			41.1		52.0	28.0		55.5	25.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		67.8			32.4		18.4	32.7		82.4	6.1	
Delay (s)		110.3			73.5		70.4	60.7		137.9	31.8	
Level of Service		F			E		E	E		F	C	
Approach Delay (s)		110.3			73.5			62.0			47.7	
Approach LOS		F			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	66.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	1249	30	72	1228	92	6	5	114	36	5	22
Future Volume (vph)	14	1249	30	72	1228	92	6	5	114	36	5	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.88			0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	1855		1770	1843			1629			1725	
Flt Permitted	0.06	1.00		0.08	1.00			0.99			0.38	
Satd. Flow (perm)	104	1855		148	1843			1611			671	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	1358	33	78	1335	100	7	5	124	39	5	24
RTOR Reduction (vph)	0	1	0	0	2	0	0	104	0	0	17	0
Lane Group Flow (vph)	15	1390	0	78	1433	0	0	32	0	0	51	0
Confl. Peds. (#/hr)			1	1			1					
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	96.1	96.1		96.1	96.1			10.6			10.6	
Effective Green, g (s)	96.1	96.1		96.1	96.1			10.6			10.6	
Actuated g/C Ratio	0.84	0.84		0.84	0.84			0.09			0.09	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	87	1554		124	1544			148			62	
v/s Ratio Prot		0.75			c0.78							
v/s Ratio Perm	0.14			0.53				0.02			c0.08	
v/c Ratio	0.17	0.89		0.63	0.93			0.21			0.82	
Uniform Delay, d1	1.8	6.0		3.2	6.8			48.2			51.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.9	7.1		9.6	10.0			0.7			54.6	
Delay (s)	2.7	13.1		12.8	16.8			48.9			105.7	
Level of Service	A	B		B	B			D			F	
Approach Delay (s)		13.0			16.6			48.9			105.7	
Approach LOS		B			B			D			F	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	114.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		

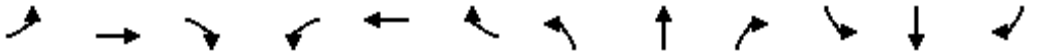
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	894	400	132	894	400	422	443	376	422	443	376
Arrive On Green	0.07	0.24	0.24	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.0	7.0	12.6	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.0	7.0	12.6	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.48	0.79	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.6	22.7	24.8	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	1.8	14.7	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	3.7	7.3	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	51.7	24.5	39.5	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	C	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		33.0			43.4			27.3			30.9	
Approach LOS		C			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	14.6		11.8	5.0	17.8
Green Ext Time (p_c), s		1.3	0.0	1.0		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	35.2
HCM 2010 LOS	D

Notes



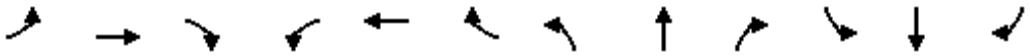
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Future Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	894	400	105	894	400	448	470	400	422	443	376
Arrive On Green	0.06	0.24	0.24	0.06	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.4	17.0	12.2	3.6	15.5	7.4	8.3	9.9	5.4	13.5	14.5	16.0
Cycle Q Clear(g_c), s	2.4	17.0	12.2	3.6	15.5	7.4	8.3	9.9	5.4	13.5	14.5	16.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	894	400	105	894	400	448	470	400	422	443	376
V/C Ratio(X)	0.63	1.05	0.77	0.91	0.93	0.50	0.56	0.65	0.38	0.87	0.93	1.13
Avail Cap(c_a), veh/h	105	894	400	105	894	400	448	470	400	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.3	26.5	24.7	32.8	25.9	22.9	23.2	23.8	22.1	26.0	26.4	27.0
Incr Delay (d2), s/veh	24.9	45.7	13.4	65.9	17.4	4.5	4.9	6.8	2.8	21.3	28.1	85.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	14.2	7.0	3.8	10.0	3.8	4.9	6.2	2.8	9.3	11.2	16.1
LnGrp Delay(d),s/veh	57.2	72.2	38.0	98.7	43.3	27.3	28.2	30.7	24.9	47.3	54.5	112.3
LnGrp LOS	E	F	D	F	D	C	C	C	C	D	D	F
Approach Vol, veh/h		1317			1129			709			1203	
Approach Delay, s/veh		63.4			45.2			28.5			72.7	
Approach LOS		E			D			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	8.0	21.0		20.0	8.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	17.0		16.0	4.0	17.0
Max Q Clear Time (g_c+I1), s		11.9	5.6	19.0		18.0	4.4	17.5
Green Ext Time (p_c), s		1.5	0.0	0.0		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	55.6
HCM 2010 LOS	E

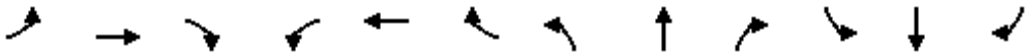
Notes

Appendix P.1 – Analysis Output Sheets (Mitigation - Future with Project Sub-Alternative Build Out SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	40	34	37	66	143	28	732	101	73	764	31
Future Volume (vph)	37	40	34	37	66	143	28	732	101	73	764	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	12	12	12	12	16	12	16	12	16	16	16
Total Lost time (s)	4.2	4.2		4.2	4.2		4.6	4.6		4.6	4.6	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.90		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	2006	1734		1770	1672		1770	2073		2006	2099	
Flt Permitted	0.45	1.00		0.70	1.00		0.25	1.00		0.23	1.00	
Satd. Flow (perm)	960	1734		1313	1672		462	2073		478	2099	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	43	37	40	72	155	30	796	110	79	830	34
RTOR Reduction (vph)	0	32	0	0	132	0	0	5	0	0	1	0
Lane Group Flow (vph)	40	48	0	40	95	0	30	901	0	79	863	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.8	8.8		8.8	8.8		42.4	42.4		42.4	42.4	
Effective Green, g (s)	8.8	8.8		8.8	8.8		42.4	42.4		42.4	42.4	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.71	0.71		0.71	0.71	
Clearance Time (s)	4.2	4.2		4.2	4.2		4.6	4.6		4.6	4.6	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		4.0	4.0		3.0	3.0	
Lane Grp Cap (vph)	140	254		192	245		326	1464		337	1483	
v/s Ratio Prot		0.03			c0.06			c0.43			0.41	
v/s Ratio Perm	0.04			0.03			0.06			0.17		
v/c Ratio	0.29	0.19		0.21	0.39		0.09	0.62		0.23	0.58	
Uniform Delay, d1	22.8	22.5		22.5	23.2		2.8	4.6		3.1	4.4	
Progression Factor	1.00	1.00		1.00	1.00		0.73	0.56		0.48	0.35	
Incremental Delay, d2	1.1	0.4		0.5	1.0		0.5	1.7		1.1	1.2	
Delay (s)	23.9	22.8		23.1	24.2		2.5	4.3		2.6	2.7	
Level of Service	C	C		C	C		A	A		A	A	
Approach Delay (s)		23.2			24.0			4.2			2.7	
Approach LOS		C			C			A			A	

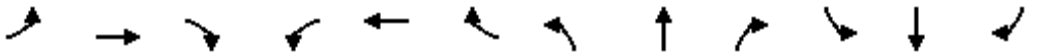
Intersection Summary			
HCM 2000 Control Delay	6.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	1277	26	0	0	0	0	13	33	59	48	0
Future Volume (vph)	49	1277	26	0	0	0	0	13	33	59	48	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		1.00						0.90			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		3523						1682			1813	
Flt Permitted		1.00						1.00			0.81	
Satd. Flow (perm)		3523						1682			1500	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	1388	28	0	0	0	0	14	36	64	52	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	23	0	0	0	0
Lane Group Flow (vph)	0	1467	0	0	0	0	0	27	0	0	116	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		23.9						8.4			8.4	
Effective Green, g (s)		23.9						8.4			8.4	
Actuated g/C Ratio		0.59						0.21			0.21	
Clearance Time (s)		4.0						4.0			4.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		2089						350			312	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.42									c0.08	
v/c Ratio		0.70						0.08			0.37	
Uniform Delay, d1		5.7						12.8			13.7	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		1.1						0.1			0.7	
Delay (s)		6.8						12.9			14.4	
Level of Service		A						B			B	
Approach Delay (s)		6.8			0.0			12.9			14.4	
Approach LOS		A			A			B			B	

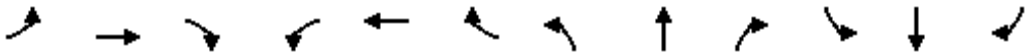
Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	40.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Appendix P.2 – Analysis Output Sheets (Mitigation - Future with Project Sub-Alternative Existing SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	0	93	0	0	0	60	813	0	0	810	136
Future Volume (vph)	86	0	93	0	0	0	60	813	0	0	810	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	12	16	16	12	12	16	16	12	12
Total Lost time (s)	4.0	4.0					4.0	4.0			4.0	
Lane Util. Factor	1.00	1.00					1.00	1.00			1.00	
Frpb, ped/bikes	1.00	0.95					1.00	1.00			0.99	
Flpb, ped/bikes	0.97	1.00					1.00	1.00			1.00	
Frt	1.00	0.85					1.00	1.00			0.98	
Flt Protected	0.95	1.00					0.95	1.00			1.00	
Satd. Flow (prot)	1717	1713					1770	1863			1812	
Flt Permitted	0.76	1.00					0.17	1.00			1.00	
Satd. Flow (perm)	1368	1713					325	1863			1812	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	0	101	0	0	0	65	884	0	0	880	148
RTOR Reduction (vph)	0	87	0	0	0	0	0	0	0	0	7	0
Lane Group Flow (vph)	93	14	0	0	0	0	65	884	0	0	1021	0
Confl. Peds. (#/hr)	16		11				10					10
Confl. Bikes (#/hr)			2									1
Turn Type	Perm	NA		Perm			Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	8.3	8.3					43.7	43.7			43.7	
Effective Green, g (s)	8.3	8.3					43.7	43.7			43.7	
Actuated g/C Ratio	0.14	0.14					0.73	0.73			0.73	
Clearance Time (s)	4.0	4.0					4.0	4.0			4.0	
Vehicle Extension (s)	3.0	3.0					3.0	3.0			3.0	
Lane Grp Cap (vph)	189	236					236	1356			1319	
v/s Ratio Prot		0.01						0.47			c0.56	
v/s Ratio Perm	c0.07						0.20					
v/c Ratio	0.49	0.06					0.28	0.65			0.77	
Uniform Delay, d1	23.9	22.5					2.8	4.2			5.1	
Progression Factor	1.00	1.00					1.00	1.00			0.29	
Incremental Delay, d2	2.0	0.1					2.9	2.4			4.1	
Delay (s)	25.9	22.6					5.6	6.7			5.6	
Level of Service	C	C					A	A			A	
Approach Delay (s)		24.2			0.0			6.6			5.6	
Approach LOS		C			A			A			A	

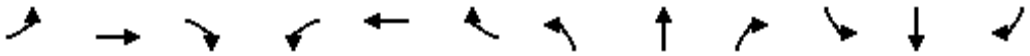
Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	1148	24	0	0	0	0	13	31	56	49	0
Future Volume (vph)	44	1148	24	0	0	0	0	13	31	56	49	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		1.00						0.90			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		3522						1685			1814	
Flt Permitted		1.00						1.00			0.81	
Satd. Flow (perm)		3522						1685			1515	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	48	1248	26	0	0	0	0	14	34	61	53	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	23	0	0	0	0
Lane Group Flow (vph)	0	1319	0	0	0	0	0	25	0	0	114	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		19.7						8.0			8.0	
Effective Green, g (s)		19.7						8.0			8.0	
Actuated g/C Ratio		0.55						0.22			0.22	
Clearance Time (s)		4.0						4.0			4.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		1943						377			339	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.37									c0.08	
v/c Ratio		0.68						0.07			0.34	
Uniform Delay, d1		5.7						10.9			11.6	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		1.0						0.1			0.6	
Delay (s)		6.7						11.0			12.2	
Level of Service		A						B			B	
Approach Delay (s)		6.7			0.0			11.0			12.2	
Approach LOS		A			A			B			B	

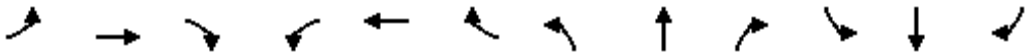
Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	35.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Appendix Q.1 – Analysis Output Sheets (Mitigation - Future with Project Alternative 1 Build Out SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Future Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		1.00						0.90			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		3524						1682			1813	
Flt Permitted		1.00						1.00			0.84	
Satd. Flow (perm)		3524						1682			1569	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	1388	28	0	0	0	0	14	36	64	52	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	1455	0	0	0	0	0	31	0	0	116	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		25.5						16.5			16.5	
Effective Green, g (s)		25.5						16.5			16.5	
Actuated g/C Ratio		0.51						0.33			0.33	
Clearance Time (s)		4.0						4.0			4.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		1797						555			517	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.41									c0.07	
v/c Ratio		0.81						0.06			0.22	
Uniform Delay, d1		10.2						11.4			12.1	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		2.8						0.2			1.0	
Delay (s)		13.0						11.6			13.1	
Level of Service		B						B			B	
Approach Delay (s)		13.0			0.0			11.6			13.1	
Approach LOS		B			A			B			B	

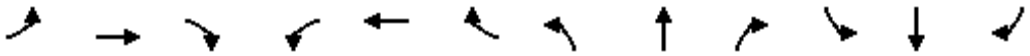
Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	375	22	20	310	69	30	42	40	75	26	21
Future Volume (vph)	14	375	22	20	310	69	30	42	40	75	26	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	408	24	22	337	75	33	46	43	82	28	23

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	447	434	122	133
Volume Left (vph)	15	22	33	82
Volume Right (vph)	24	75	43	23
Hadj (s)	0.01	-0.06	-0.12	0.05
Departure Headway (s)	5.5	5.4	6.5	6.6
Degree Utilization, x	0.68	0.65	0.22	0.24
Capacity (veh/h)	447	635	459	453
Control Delay (s)	19.2	18.0	11.3	11.7
Approach Delay (s)	19.2	18.0	11.3	11.7
Approach LOS	C	C	B	B

Intersection Summary				
Delay	17.0			
Level of Service	C			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1116	26	61	1097	61	5	4	97	24	4	15
Future Volume (vph)	9	1116	26	61	1097	61	5	4	97	24	4	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.88			0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	1856		1770	1848			1627			1726	
Flt Permitted	0.10	1.00		0.11	1.00			0.99			0.71	
Satd. Flow (perm)	188	1856		203	1848			1608			1267	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	1213	28	66	1192	66	5	4	105	26	4	16
RTOR Reduction (vph)	0	1	0	0	2	0	0	94	0	0	14	0
Lane Group Flow (vph)	10	1240	0	66	1256	0	0	20	0	0	32	0
Confl. Peds. (#/hr)			1	1			1					
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	55.4	55.4		55.4	55.4			7.4			7.4	
Effective Green, g (s)	55.4	55.4		55.4	55.4			7.4			7.4	
Actuated g/C Ratio	0.78	0.78		0.78	0.78			0.10			0.10	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	147	1452		158	1446			168			132	
v/s Ratio Prot		0.67			c0.68							
v/s Ratio Perm	0.05			0.32				0.01			c0.03	
v/c Ratio	0.07	0.85		0.42	0.87			0.12			0.24	
Uniform Delay, d1	1.8	5.1		2.5	5.2			28.7			29.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.2	5.1		1.8	5.8			0.3			0.9	
Delay (s)	2.0	10.2		4.3	11.1			29.1			30.1	
Level of Service	A	B		A	B			C			C	
Approach Delay (s)		10.1			10.7			29.1			30.1	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	894	400	132	894	400	422	443	376	422	443	376
Arrive On Green	0.02	0.08	0.08	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.1	7.8	13.2	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.1	7.8	13.2	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.48	0.79	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	27.9	30.4	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	1.8	14.7	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	4.2	7.7	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	53.4	29.8	45.1	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	C	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		38.0			43.4			27.3			30.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	15.2		11.8	5.1	17.8
Green Ext Time (p_c), s		1.3	0.0	0.8		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	36.5
HCM 2010 LOS	D

Notes

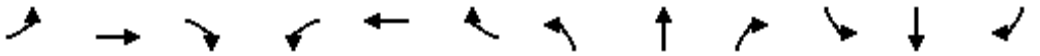
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	916	284	88	807	170	361	96	141	403	234	374
Future Volume (veh/h)	58	916	284	88	807	170	361	96	141	403	234	374
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	63	996	309	96	877	185	248	306	153	346	383	407
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	946	423	105	946	423	422	443	376	422	443	376
Arrive On Green	0.06	0.26	0.26	0.06	0.26	0.26	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	63	996	309	96	877	185	248	306	153	346	383	407
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.3	18.0	12.0	3.6	16.3	6.6	8.4	10.1	5.5	12.5	13.3	16.0
Cycle Q Clear(g_c), s	2.3	18.0	12.0	3.6	16.3	6.6	8.4	10.1	5.5	12.5	13.3	16.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	946	423	105	946	423	422	443	376	422	443	376
V/C Ratio(X)	0.60	1.05	0.73	0.91	0.93	0.44	0.59	0.69	0.41	0.82	0.86	1.08
Avail Cap(c_a), veh/h	105	946	423	105	946	423	422	443	376	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.2	26.0	23.8	32.8	25.4	21.8	24.1	24.7	23.0	25.6	26.0	27.0
Incr Delay (d2), s/veh	22.5	44.0	10.6	65.9	16.1	3.3	5.9	8.6	3.2	16.2	19.7	69.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	14.9	6.6	3.8	10.3	3.4	5.0	6.4	2.8	8.2	9.5	14.5
LnGrp Delay(d),s/veh	54.8	70.0	34.3	98.7	41.5	25.0	30.0	33.3	26.2	41.9	45.6	96.9
LnGrp LOS	D	F	C	F	D	C	C	C	C	D	D	F
Approach Vol, veh/h		1368			1158			707			1136	
Approach Delay, s/veh		61.2			43.6			30.6			62.9	
Approach LOS		E			D			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	8.0	22.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		12.1	5.6	20.0		18.0	4.3	18.3
Green Ext Time (p_c), s		1.2	0.0	0.0		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	52.0
HCM 2010 LOS	D

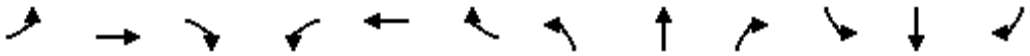
Notes

Appendix Q.2 – Analysis Output Sheets (Mitigation - Future with Project Alternative 1 Existing SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	27	79	4	27	10	60	810	9	5	810	136
Future Volume (vph)	72	27	79	4	27	10	60	810	9	5	810	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	12	16	16	12	12	16	16	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.97		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.96		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1719	1810		1770	2024		1770	1860		2006	1812	
Flt Permitted	0.73	1.00		0.68	1.00		0.18	1.00		0.25	1.00	
Satd. Flow (perm)	1323	1810		1272	2024		336	1860		522	1812	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	29	86	4	29	11	65	880	10	5	880	148
RTOR Reduction (vph)	0	75	0	0	10	0	0	1	0	0	7	0
Lane Group Flow (vph)	78	40	0	4	30	0	65	889	0	5	1021	0
Confl. Peds. (#/hr)	16		11				10					10
Confl. Bikes (#/hr)			2									1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.8	7.8		7.8	7.8		44.2	44.2		44.2	44.2	
Effective Green, g (s)	7.8	7.8		7.8	7.8		44.2	44.2		44.2	44.2	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.74	0.74		0.74	0.74	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	171	235		165	263		247	1370		384	1334	
v/s Ratio Prot		0.02			0.02			0.48			c0.56	
v/s Ratio Perm	c0.06			0.00			0.19			0.01		
v/c Ratio	0.46	0.17		0.02	0.12		0.26	0.65		0.01	0.77	
Uniform Delay, d1	24.1	23.2		22.8	23.1		2.6	4.0		2.1	4.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.83	0.73	
Incremental Delay, d2	1.9	0.3		0.1	0.2		2.6	2.4		0.1	3.9	
Delay (s)	26.1	23.6		22.8	23.3		5.2	6.4		1.8	7.4	
Level of Service	C	C		C	C		A	A		A	A	
Approach Delay (s)		24.6			23.2			6.3			7.3	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Future Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		1.00						0.90			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		3523						1685			1814	
Flt Permitted		1.00						1.00			0.85	
Satd. Flow (perm)		3523						1685			1589	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	1248	26	0	0	0	0	14	34	61	53	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	1311	0	0	0	0	0	30	0	0	114	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		20.7						16.3			16.3	
Effective Green, g (s)		20.7						16.3			16.3	
Actuated g/C Ratio		0.46						0.36			0.36	
Clearance Time (s)		4.0						4.0			4.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		1620						610			575	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.37									c0.07	
v/c Ratio		0.81						0.05			0.20	
Uniform Delay, d1		10.5						9.3			9.9	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		3.1						0.1			0.8	
Delay (s)		13.5						9.5			10.6	
Level of Service		B						A			B	
Approach Delay (s)		13.5			0.0			9.5			10.6	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	1249	30	72	1228	92	6	5	114	36	5	22
Future Volume (vph)	14	1249	30	72	1228	92	6	5	114	36	5	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.88			0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	1855		1770	1843			1629			1725	
Flt Permitted	0.06	1.00		0.08	1.00			0.99			0.38	
Satd. Flow (perm)	104	1855		148	1843			1611			671	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	1358	33	78	1335	100	7	5	124	39	5	24
RTOR Reduction (vph)	0	1	0	0	2	0	0	104	0	0	17	0
Lane Group Flow (vph)	15	1390	0	78	1433	0	0	32	0	0	51	0
Confl. Peds. (#/hr)			1	1			1					
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	96.1	96.1		96.1	96.1			10.6			10.6	
Effective Green, g (s)	96.1	96.1		96.1	96.1			10.6			10.6	
Actuated g/C Ratio	0.84	0.84		0.84	0.84			0.09			0.09	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	87	1554		124	1544			148			62	
v/s Ratio Prot		0.75			c0.78							
v/s Ratio Perm	0.14			0.53				0.02			c0.08	
v/c Ratio	0.17	0.89		0.63	0.93			0.21			0.82	
Uniform Delay, d1	1.8	6.0		3.2	6.8			48.2			51.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.9	7.1		9.6	10.0			0.7			54.6	
Delay (s)	2.7	13.1		12.8	16.8			48.9			105.7	
Level of Service	A	B		B	B			D			F	
Approach Delay (s)		13.0			16.6			48.9			105.7	
Approach LOS		B			B			D			F	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	114.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	43	27	31	26	197	10	317	30	180	300	62
Future Volume (vph)	28	43	27	31	26	197	10	317	30	180	300	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.96			0.90			0.99			0.98	
Flt Protected		0.99			0.99			1.00			0.98	
Satd. Flow (prot)		2005			1879			3954			3878	
Flt Permitted		0.87			0.94			0.94			0.73	
Satd. Flow (perm)		1778			1777			3714			2884	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	47	29	34	28	214	11	345	33	196	326	67
RTOR Reduction (vph)	0	23	0	0	167	0	0	15	0	0	21	0
Lane Group Flow (vph)	0	83	0	0	109	0	0	374	0	0	568	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		6.2			6.2			14.0			14.0	
Effective Green, g (s)		6.2			6.2			14.0			14.0	
Actuated g/C Ratio		0.22			0.22			0.50			0.50	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		390			390			1843			1431	
v/s Ratio Prot												
v/s Ratio Perm		0.05			c0.06			0.10			c0.20	
v/c Ratio		0.21			0.28			0.20			0.40	
Uniform Delay, d1		9.0			9.1			4.0			4.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.4			0.1			0.2	
Delay (s)		9.3			9.5			4.0			4.6	
Level of Service		A			A			A			A	
Approach Delay (s)		9.3			9.5			4.0			4.6	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	28.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	894	400	132	894	400	422	443	376	422	443	376
Arrive On Green	0.02	0.08	0.08	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.1	7.8	13.2	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.1	7.8	13.2	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.48	0.79	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	27.9	30.4	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	1.8	14.7	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	4.2	7.7	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	53.4	29.8	45.1	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	C	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		38.0			43.4			27.3			30.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	15.2		11.8	5.1	17.8
Green Ext Time (p_c), s		1.3	0.0	0.8		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	36.5
HCM 2010 LOS	D

Notes

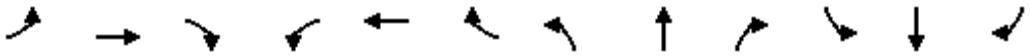
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Future Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	894	400	105	894	400	448	470	400	422	443	376
Arrive On Green	0.06	0.24	0.24	0.06	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.4	17.0	12.2	3.6	15.5	7.4	8.3	9.9	5.4	13.5	14.5	16.0
Cycle Q Clear(g_c), s	2.4	17.0	12.2	3.6	15.5	7.4	8.3	9.9	5.4	13.5	14.5	16.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	894	400	105	894	400	448	470	400	422	443	376
V/C Ratio(X)	0.63	1.05	0.77	0.91	0.93	0.50	0.56	0.65	0.38	0.87	0.93	1.13
Avail Cap(c_a), veh/h	105	894	400	105	894	400	448	470	400	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.3	26.5	24.7	32.8	25.9	22.9	23.2	23.8	22.1	26.0	26.4	27.0
Incr Delay (d2), s/veh	24.9	45.7	13.4	65.9	17.4	4.5	4.9	6.8	2.8	21.3	28.1	85.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	14.2	7.0	3.8	10.0	3.8	4.9	6.2	2.8	9.3	11.2	16.1
LnGrp Delay(d),s/veh	57.2	72.2	38.0	98.7	43.3	27.3	28.2	30.7	24.9	47.3	54.5	112.3
LnGrp LOS	E	F	D	F	D	C	C	C	C	D	D	F
Approach Vol, veh/h		1317			1129			709			1203	
Approach Delay, s/veh		63.4			45.2			28.5			72.7	
Approach LOS		E			D			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	8.0	21.0		20.0	8.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	17.0		16.0	4.0	17.0
Max Q Clear Time (g_c+I1), s		11.9	5.6	19.0		18.0	4.4	17.5
Green Ext Time (p_c), s		1.5	0.0	0.0		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	55.6
HCM 2010 LOS	E

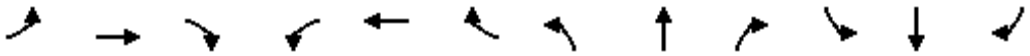
Notes

Appendix R.1 – Analysis Output Sheets (Mitigation - Future with Project Alternative 2 Build Out SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Future Volume (vph)	39	1277	26	0	0	0	0	13	33	59	48	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		1.00						0.90			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		3524						1682			1813	
Flt Permitted		1.00						1.00			0.84	
Satd. Flow (perm)		3524						1682			1569	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	42	1388	28	0	0	0	0	14	36	64	52	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	19	0	0	0	0
Lane Group Flow (vph)	0	1455	0	0	0	0	0	31	0	0	116	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		25.5						16.5			16.5	
Effective Green, g (s)		25.5						16.5			16.5	
Actuated g/C Ratio		0.51						0.33			0.33	
Clearance Time (s)		4.0						4.0			4.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		1797						555			517	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.41									c0.07	
v/c Ratio		0.81						0.06			0.22	
Uniform Delay, d1		10.2						11.4			12.1	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		2.8						0.2			1.0	
Delay (s)		13.0						11.6			13.1	
Level of Service		B						B			B	
Approach Delay (s)		13.0			0.0			11.6			13.1	
Approach LOS		B			A			B			B	

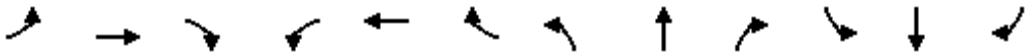
Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	50.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	375	22	20	310	69	30	42	40	75	26	21
Future Volume (vph)	14	375	22	20	310	69	30	42	40	75	26	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	408	24	22	337	75	33	46	43	82	28	23

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	447	434	122	133
Volume Left (vph)	15	22	33	82
Volume Right (vph)	24	75	43	23
Hadj (s)	0.01	-0.06	-0.12	0.05
Departure Headway (s)	5.5	5.4	6.5	6.6
Degree Utilization, x	0.68	0.65	0.22	0.24
Capacity (veh/h)	447	635	459	453
Control Delay (s)	19.2	18.0	11.3	11.7
Approach Delay (s)	19.2	18.0	11.3	11.7
Approach LOS	C	C	B	B

Intersection Summary				
Delay	17.0			
Level of Service	C			
Intersection Capacity Utilization	49.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1116	26	61	1097	61	5	4	97	24	4	15
Future Volume (vph)	9	1116	26	61	1097	61	5	4	97	24	4	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.88			0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	1856		1770	1848			1627			1726	
Flt Permitted	0.10	1.00		0.11	1.00			0.99			0.71	
Satd. Flow (perm)	188	1856		203	1848			1608			1267	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	1213	28	66	1192	66	5	4	105	26	4	16
RTOR Reduction (vph)	0	1	0	0	2	0	0	94	0	0	14	0
Lane Group Flow (vph)	10	1240	0	66	1256	0	0	20	0	0	32	0
Confl. Peds. (#/hr)			1	1			1					
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	55.4	55.4		55.4	55.4			7.4			7.4	
Effective Green, g (s)	55.4	55.4		55.4	55.4			7.4			7.4	
Actuated g/C Ratio	0.78	0.78		0.78	0.78			0.10			0.10	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	147	1452		158	1446			168			132	
v/s Ratio Prot		0.67			c0.68							
v/s Ratio Perm	0.05			0.32				0.01			c0.03	
v/c Ratio	0.07	0.85		0.42	0.87			0.12			0.24	
Uniform Delay, d1	1.8	5.1		2.5	5.2			28.7			29.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.2	5.1		1.8	5.8			0.3			0.9	
Delay (s)	2.0	10.2		4.3	11.1			29.1			30.1	
Level of Service	A	B		A	B			C			C	
Approach Delay (s)		10.1			10.7			29.1			30.1	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	894	400	132	894	400	422	443	376	422	443	376
Arrive On Green	0.02	0.08	0.08	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.1	7.8	13.2	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.1	7.8	13.2	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.48	0.79	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	27.9	30.4	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	1.8	14.7	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	4.2	7.7	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	53.4	29.8	45.1	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	C	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		38.0			43.4			27.3			30.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	15.2		11.8	5.1	17.8
Green Ext Time (p_c), s		1.3	0.0	0.8		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	36.5
HCM 2010 LOS	D

Notes

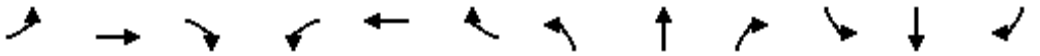
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	916	284	88	807	170	361	96	141	403	234	374
Future Volume (veh/h)	58	916	284	88	807	170	361	96	141	403	234	374
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	63	996	309	96	877	185	248	306	153	346	383	407
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	946	423	105	946	423	422	443	376	422	443	376
Arrive On Green	0.06	0.26	0.26	0.06	0.26	0.26	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	63	996	309	96	877	185	248	306	153	346	383	407
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.3	18.0	12.0	3.6	16.3	6.6	8.4	10.1	5.5	12.5	13.3	16.0
Cycle Q Clear(g_c), s	2.3	18.0	12.0	3.6	16.3	6.6	8.4	10.1	5.5	12.5	13.3	16.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	946	423	105	946	423	422	443	376	422	443	376
V/C Ratio(X)	0.60	1.05	0.73	0.91	0.93	0.44	0.59	0.69	0.41	0.82	0.86	1.08
Avail Cap(c_a), veh/h	105	946	423	105	946	423	422	443	376	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.2	26.0	23.8	32.8	25.4	21.8	24.1	24.7	23.0	25.6	26.0	27.0
Incr Delay (d2), s/veh	22.5	44.0	10.6	65.9	16.1	3.3	5.9	8.6	3.2	16.2	19.7	69.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	14.9	6.6	3.8	10.3	3.4	5.0	6.4	2.8	8.2	9.5	14.5
LnGrp Delay(d),s/veh	54.8	70.0	34.3	98.7	41.5	25.0	30.0	33.3	26.2	41.9	45.6	96.9
LnGrp LOS	D	F	C	F	D	C	C	C	C	D	D	F
Approach Vol, veh/h		1368			1158			707			1136	
Approach Delay, s/veh		61.2			43.6			30.6			62.9	
Approach LOS		E			D			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	8.0	22.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		12.1	5.6	20.0		18.0	4.3	18.3
Green Ext Time (p_c), s		1.2	0.0	0.0		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	52.0
HCM 2010 LOS	D

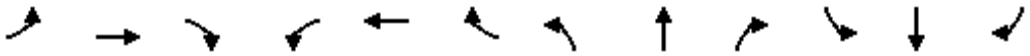
Notes

Appendix R.2 – Analysis Output Sheets (Mitigation - Future with Project Alternative 2 Existing SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	27	79	4	27	10	60	810	9	5	810	136
Future Volume (vph)	72	27	79	4	27	10	60	810	9	5	810	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	12	16	16	12	12	16	16	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.97		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.96		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1719	1810		1770	2024		1770	1860		2006	1812	
Flt Permitted	0.73	1.00		0.68	1.00		0.18	1.00		0.25	1.00	
Satd. Flow (perm)	1323	1810		1272	2024		336	1860		522	1812	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	29	86	4	29	11	65	880	10	5	880	148
RTOR Reduction (vph)	0	75	0	0	10	0	0	1	0	0	7	0
Lane Group Flow (vph)	78	40	0	4	30	0	65	889	0	5	1021	0
Confl. Peds. (#/hr)	16		11				10					10
Confl. Bikes (#/hr)			2									1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	7.8	7.8		7.8	7.8		44.2	44.2		44.2	44.2	
Effective Green, g (s)	7.8	7.8		7.8	7.8		44.2	44.2		44.2	44.2	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.74	0.74		0.74	0.74	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	171	235		165	263		247	1370		384	1334	
v/s Ratio Prot		0.02			0.02			0.48			c0.56	
v/s Ratio Perm	c0.06			0.00			0.19			0.01		
v/c Ratio	0.46	0.17		0.02	0.12		0.26	0.65		0.01	0.77	
Uniform Delay, d1	24.1	23.2		22.8	23.1		2.6	4.0		2.1	4.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		0.83	0.73	
Incremental Delay, d2	1.9	0.3		0.1	0.2		2.6	2.4		0.1	3.9	
Delay (s)	26.1	23.6		22.8	23.3		5.2	6.4		1.8	7.4	
Level of Service	C	C		C	C		A	A		A	A	
Approach Delay (s)		24.6			23.2			6.3			7.3	
Approach LOS		C			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



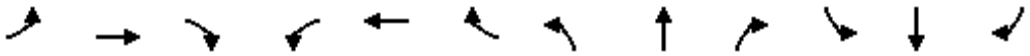
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Future Volume (vph)	37	1148	24	0	0	0	0	13	31	56	49	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		1.00						0.90			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		3523						1685			1814	
Flt Permitted		1.00						1.00			0.85	
Satd. Flow (perm)		3523						1685			1589	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	40	1248	26	0	0	0	0	14	34	61	53	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	18	0	0	0	0
Lane Group Flow (vph)	0	1311	0	0	0	0	0	30	0	0	114	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		20.7						16.3			16.3	
Effective Green, g (s)		20.7						16.3			16.3	
Actuated g/C Ratio		0.46						0.36			0.36	
Clearance Time (s)		4.0						4.0			4.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		1620						610			575	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.37									c0.07	
v/c Ratio		0.81						0.05			0.20	
Uniform Delay, d1		10.5						9.3			9.9	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		3.1						0.1			0.8	
Delay (s)		13.5						9.5			10.6	
Level of Service		B						A			B	
Approach Delay (s)		13.5			0.0			9.5			10.6	
Approach LOS		B			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	45.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	1249	30	72	1228	92	6	5	114	36	5	22
Future Volume (vph)	14	1249	30	72	1228	92	6	5	114	36	5	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.88			0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	1855		1770	1843			1629			1725	
Flt Permitted	0.06	1.00		0.08	1.00			0.99			0.38	
Satd. Flow (perm)	104	1855		148	1843			1611			671	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	15	1358	33	78	1335	100	7	5	124	39	5	24
RTOR Reduction (vph)	0	1	0	0	2	0	0	104	0	0	17	0
Lane Group Flow (vph)	15	1390	0	78	1433	0	0	32	0	0	51	0
Confl. Peds. (#/hr)			1	1			1					
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	96.1	96.1		96.1	96.1			10.6			10.6	
Effective Green, g (s)	96.1	96.1		96.1	96.1			10.6			10.6	
Actuated g/C Ratio	0.84	0.84		0.84	0.84			0.09			0.09	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	87	1554		124	1544			148			62	
v/s Ratio Prot		0.75			c0.78							
v/s Ratio Perm	0.14			0.53				0.02			c0.08	
v/c Ratio	0.17	0.89		0.63	0.93			0.21			0.82	
Uniform Delay, d1	1.8	6.0		3.2	6.8			48.2			51.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.9	7.1		9.6	10.0			0.7			54.6	
Delay (s)	2.7	13.1		12.8	16.8			48.9			105.7	
Level of Service	A	B		B	B			D			F	
Approach Delay (s)		13.0			16.6			48.9			105.7	
Approach LOS		B			B			D			F	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	114.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	43	27	31	26	197	10	317	30	180	300	62
Future Volume (vph)	28	43	27	31	26	197	10	317	30	180	300	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			0.95			0.95	
Frt		0.96			0.90			0.99			0.98	
Flt Protected		0.99			0.99			1.00			0.98	
Satd. Flow (prot)		2005			1879			3954			3878	
Flt Permitted		0.87			0.94			0.94			0.73	
Satd. Flow (perm)		1778			1777			3714			2884	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	47	29	34	28	214	11	345	33	196	326	67
RTOR Reduction (vph)	0	23	0	0	167	0	0	15	0	0	21	0
Lane Group Flow (vph)	0	83	0	0	109	0	0	374	0	0	568	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		6.2			6.2			14.0			14.0	
Effective Green, g (s)		6.2			6.2			14.0			14.0	
Actuated g/C Ratio		0.22			0.22			0.50			0.50	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		390			390			1843			1431	
v/s Ratio Prot												
v/s Ratio Perm		0.05			c0.06			0.10			c0.20	
v/c Ratio		0.21			0.28			0.20			0.40	
Uniform Delay, d1		9.0			9.1			4.0			4.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			0.4			0.1			0.2	
Delay (s)		9.3			9.5			4.0			4.6	
Level of Service		A			A			A			A	
Approach Delay (s)		9.3			9.5			4.0			4.6	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	5.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	28.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Future Volume (veh/h)	75	393	291	84	778	183	258	130	80	226	273	194
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	132	894	400	132	894	400	422	443	376	422	443	376
Arrive On Green	0.02	0.08	0.08	0.07	0.24	0.24	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	82	427	316	91	846	199	210	238	87	246	297	211
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	3.1	7.8	13.2	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Cycle Q Clear(g_c), s	3.1	7.8	13.2	3.4	15.8	7.3	6.9	7.6	3.0	8.3	9.8	7.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
V/C Ratio(X)	0.62	0.48	0.79	0.69	0.95	0.50	0.50	0.54	0.23	0.58	0.67	0.56
Avail Cap(c_a), veh/h	132	894	400	132	894	400	422	443	376	422	443	376
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	27.9	30.4	31.7	26.1	22.8	23.5	23.7	22.0	24.0	24.6	23.9
Incr Delay (d2), s/veh	20.1	1.8	14.7	25.7	19.6	4.4	4.2	4.6	1.4	5.8	7.9	5.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	4.2	7.7	2.7	10.4	3.8	4.0	4.6	1.5	4.9	6.2	4.2
LnGrp Delay(d),s/veh	53.4	29.8	45.1	57.5	45.7	27.2	27.7	28.4	23.4	29.8	32.5	29.8
LnGrp LOS	D	C	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		825			1136			535			754	
Approach Delay, s/veh		38.0			43.4			27.3			30.9	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	9.0	21.0		20.0	9.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	5.0	17.0		16.0	5.0	17.0
Max Q Clear Time (g_c+I1), s		9.6	5.4	15.2		11.8	5.1	17.8
Green Ext Time (p_c), s		1.3	0.0	0.8		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	36.5
HCM 2010 LOS	D

Notes

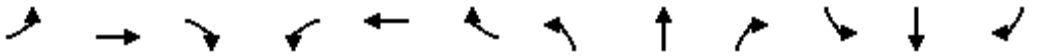
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Future Volume (veh/h)	61	868	283	88	765	185	360	99	141	437	240	390
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	894	400	105	894	400	448	470	400	422	443	376
Arrive On Green	0.06	0.24	0.24	0.06	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	66	943	308	96	832	201	250	306	153	368	411	424
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.4	17.0	12.2	3.6	15.5	7.4	8.3	9.9	5.4	13.5	14.5	16.0
Cycle Q Clear(g_c), s	2.4	17.0	12.2	3.6	15.5	7.4	8.3	9.9	5.4	13.5	14.5	16.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	894	400	105	894	400	448	470	400	422	443	376
V/C Ratio(X)	0.63	1.05	0.77	0.91	0.93	0.50	0.56	0.65	0.38	0.87	0.93	1.13
Avail Cap(c_a), veh/h	105	894	400	105	894	400	448	470	400	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.3	26.5	24.7	32.8	25.9	22.9	23.2	23.8	22.1	26.0	26.4	27.0
Incr Delay (d2), s/veh	24.9	45.7	13.4	65.9	17.4	4.5	4.9	6.8	2.8	21.3	28.1	85.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	14.2	7.0	3.8	10.0	3.8	4.9	6.2	2.8	9.3	11.2	16.1
LnGrp Delay(d),s/veh	57.2	72.2	38.0	98.7	43.3	27.3	28.2	30.7	24.9	47.3	54.5	112.3
LnGrp LOS	E	F	D	F	D	C	C	C	C	D	D	F
Approach Vol, veh/h		1317			1129			709			1203	
Approach Delay, s/veh		63.4			45.2			28.5			72.7	
Approach LOS		E			D			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	8.0	21.0		20.0	8.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	4.0	17.0		16.0	4.0	17.0
Max Q Clear Time (g_c+I1), s		11.9	5.6	19.0		18.0	4.4	17.5
Green Ext Time (p_c), s		1.5	0.0	0.0		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	55.6
HCM 2010 LOS	E

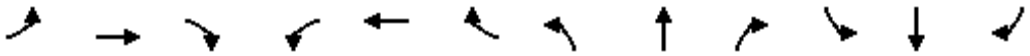
Notes

Appendix S.1 – Analysis Output Sheets (Mitigation - Future with Project Alternative 3 Build Out SR-78)



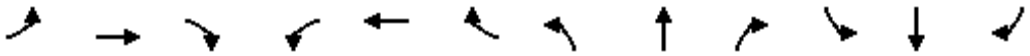
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	39	109	4	39	10	83	804	8	5	804	188
Future Volume (vph)	99	39	109	4	39	10	83	804	8	5	804	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	12	16	16	12	12	16	16	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.96		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.97		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1712	1811		1770	2045		1770	1860		2006	1796	
Flt Permitted	0.72	1.00		0.55	1.00		0.15	1.00		0.24	1.00	
Satd. Flow (perm)	1302	1811		1029	2045		270	1860		509	1796	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	42	118	4	42	11	90	874	9	5	874	204
RTOR Reduction (vph)	0	99	0	0	9	0	0	1	0	0	10	0
Lane Group Flow (vph)	108	61	0	4	44	0	90	882	0	5	1068	0
Confl. Peds. (#/hr)	16		11				10					10
Confl. Bikes (#/hr)			2									1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.1	11.1		11.1	11.1		50.9	50.9		50.9	50.9	
Effective Green, g (s)	11.1	11.1		11.1	11.1		50.9	50.9		50.9	50.9	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.73	0.73		0.73	0.73	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	206	287		163	324		196	1352		370	1305	
v/s Ratio Prot		0.03			0.02			0.47			c0.60	
v/s Ratio Perm	c0.08			0.00			0.33			0.01		
v/c Ratio	0.52	0.21		0.02	0.14		0.46	0.65		0.01	0.82	
Uniform Delay, d1	27.0	25.6		24.9	25.3		3.9	5.0		2.6	6.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.4	0.4		0.1	0.2		7.6	2.5		0.1	5.8	
Delay (s)	29.4	26.0		24.9	25.5		11.5	7.4		2.7	12.3	
Level of Service	C	C		C	C		B	A		A	B	
Approach Delay (s)		27.4			25.5			7.8			12.2	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1249	26	0	0	0	0	12	33	57	45	0
Future Volume (vph)	36	1249	26	0	0	0	0	12	33	57	45	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		1.00						0.90			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		3524						1678			1812	
Flt Permitted		1.00						1.00			0.80	
Satd. Flow (perm)		3524						1678			1497	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1358	28	0	0	0	0	13	36	62	49	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	25	0	0	0	0
Lane Group Flow (vph)	0	1423	0	0	0	0	0	24	0	0	111	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		23.5						8.2			8.2	
Effective Green, g (s)		23.5						8.2			8.2	
Actuated g/C Ratio		0.59						0.21			0.21	
Clearance Time (s)		4.0						4.0			4.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		2085						346			309	
v/s Ratio Prot								0.01				
v/s Ratio Perm		0.40									c0.07	
v/c Ratio		0.68						0.07			0.36	
Uniform Delay, d1		5.5						12.7			13.5	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		0.9						0.1			0.7	
Delay (s)		6.5						12.8			14.2	
Level of Service		A						B			B	
Approach Delay (s)		6.5			0.0			12.8			14.2	
Approach LOS		A			A			B			B	

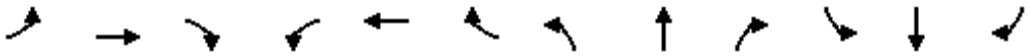
Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	39.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	14	366	21	19	302	70	29	42	38	77	26	21
Future Volume (vph)	14	366	21	19	302	70	29	42	38	77	26	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	398	23	21	328	76	32	46	41	84	28	23

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	436	425	119	135
Volume Left (vph)	15	21	32	84
Volume Right (vph)	23	76	41	23
Hadj (s)	0.01	-0.06	-0.12	0.06
Departure Headway (s)	5.4	5.4	6.4	6.5
Degree Utilization, x	0.66	0.63	0.21	0.25
Capacity (veh/h)	635	642	465	459
Control Delay (s)	18.2	17.2	11.1	11.7
Approach Delay (s)	18.2	17.2	11.1	11.7
Approach LOS	C	C	B	B

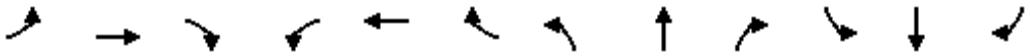
Intersection Summary				
Delay	16.3			
Level of Service	C			
Intersection Capacity Utilization	48.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	0	380	65	70	231	0	143	0	121	0	0	0
Future Volume (vph)	0	380	65	70	231	0	143	0	121	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	413	71	76	251	0	155	0	132	0	0	0

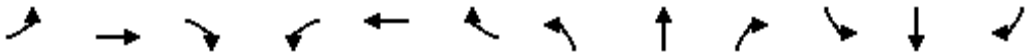
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	484	327	287	0
Volume Left (vph)	0	76	155	0
Volume Right (vph)	71	0	132	0
Hadj (s)	-0.05	0.08	-0.13	0.00
Departure Headway (s)	5.3	5.6	5.9	6.8
Degree Utilization, x	0.71	0.51	0.47	0.00
Capacity (veh/h)	657	610	563	436
Control Delay (s)	20.1	14.3	13.9	9.8
Approach Delay (s)	20.1	14.3	13.9	0.0
Approach LOS	C	B	B	A

Intersection Summary				
Delay	16.8			
Level of Service	C			
Intersection Capacity Utilization	65.3%	ICU Level of Service	C	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	204	75	75	92	28	87	119	34	44	46	50
Future Volume (vph)	50	204	75	75	92	28	87	119	34	44	46	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.98			0.98			0.95	
Flt Protected		0.99			0.98			0.98			0.98	
Satd. Flow (prot)		1792			1792			1794			1746	
Flt Permitted		0.92			0.81			0.84			0.85	
Satd. Flow (perm)		1668			1486			1532			1506	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	222	82	82	100	30	95	129	37	48	50	54
RTOR Reduction (vph)	0	29	0	0	16	0	0	16	0	0	34	0
Lane Group Flow (vph)	0	329	0	0	196	0	0	245	0	0	118	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.7			10.7			11.1			11.1	
Effective Green, g (s)		10.7			10.7			11.1			11.1	
Actuated g/C Ratio		0.36			0.36			0.37			0.37	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		598			533			570			560	
v/s Ratio Prot												
v/s Ratio Perm		c0.20			0.13			c0.16			0.08	
v/c Ratio		0.55			0.37			0.43			0.21	
Uniform Delay, d1		7.6			7.1			7.0			6.4	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.1			0.4			0.5			0.2	
Delay (s)		8.7			7.5			7.5			6.6	
Level of Service		A			A			A			A	
Approach Delay (s)		8.7			7.5			7.5			6.6	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	29.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	976	25	61	960	97	5	4	97	38	4	23
Future Volume (vph)	15	976	25	61	960	97	5	4	97	38	4	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	0.99			0.88			0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00			0.97	
Satd. Flow (prot)	1770	1855		1770	1837			1627			1722	
Flt Permitted	0.12	1.00		0.15	1.00			0.99			0.77	
Satd. Flow (perm)	218	1855		275	1837			1608			1373	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	1061	27	66	1043	105	5	4	105	41	4	25
RTOR Reduction (vph)	0	1	0	0	4	0	0	91	0	0	22	0
Lane Group Flow (vph)	16	1087	0	66	1144	0	0	23	0	0	48	0
Confl. Peds. (#/hr)			1	1			1					
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	43.1	43.1		43.1	43.1			7.8			7.8	
Effective Green, g (s)	43.1	43.1		43.1	43.1			7.8			7.8	
Actuated g/C Ratio	0.73	0.73		0.73	0.73			0.13			0.13	
Clearance Time (s)	4.0	4.0		4.0	4.0			4.0			4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	159	1357		201	1344			212			181	
v/s Ratio Prot		0.59			c0.62							
v/s Ratio Perm	0.07			0.24				0.01			c0.04	
v/c Ratio	0.10	0.80		0.33	0.85			0.11			0.27	
Uniform Delay, d1	2.3	5.1		2.8	5.6			22.5			23.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.3	3.5		1.0	5.4			0.2			0.8	
Delay (s)	2.6	8.6		3.7	11.0			22.7			23.8	
Level of Service	A	A		A	B			C			C	
Approach Delay (s)		8.5			10.6			22.7			23.8	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	73	412	293	84	815	172	260	128	80	212	269	189
Future Volume (veh/h)	73	412	293	84	815	172	260	128	80	212	269	189
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1976
Adj Flow Rate, veh/h	79	448	318	91	886	187	211	240	87	230	292	205
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	841	376	132	894	400	448	470	400	422	491	335
Arrive On Green	0.06	0.23	0.23	0.07	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	2150	1466
Grp Volume(v), veh/h	79	448	318	91	886	187	211	240	87	230	262	235
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1679
Q Serve(g_s), s	3.0	7.5	12.9	3.4	16.8	6.8	6.8	7.5	3.0	7.7	8.5	8.8
Cycle Q Clear(g_c), s	3.0	7.5	12.9	3.4	16.8	6.8	6.8	7.5	3.0	7.7	8.5	8.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.87
Lane Grp Cap(c), veh/h	105	841	376	132	894	400	448	470	400	422	443	384
V/C Ratio(X)	0.75	0.53	0.84	0.69	0.99	0.47	0.47	0.51	0.22	0.55	0.59	0.61
Avail Cap(c_a), veh/h	105	841	376	132	894	400	448	470	400	422	443	384
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.5	23.7	25.8	31.7	26.4	22.6	22.7	22.9	21.2	23.8	24.1	24.2
Incr Delay (d2), s/veh	38.1	2.4	20.2	25.7	28.0	3.9	3.5	3.9	1.2	5.0	5.7	7.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	4.1	7.9	2.7	12.0	3.5	3.9	4.5	1.5	4.5	5.2	4.8
LnGrp Delay(d),s/veh	70.6	26.1	46.0	57.5	54.5	26.5	26.2	26.8	22.4	28.8	29.8	31.3
LnGrp LOS	E	C	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		845			1164			538			727	
Approach Delay, s/veh		37.8			50.2			25.9			30.0	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	20.0		20.0	8.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	16.0		16.0	4.0	17.0
Max Q Clear Time (g_c+I1), s		9.5	5.4	14.9		10.8	5.0	18.8
Green Ext Time (p_c), s		1.5	0.0	0.5		1.8	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	38.5
HCM 2010 LOS	D

Notes

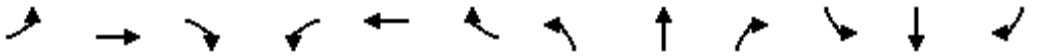
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	908	285	88	800	174	363	97	141	410	236	381
Future Volume (veh/h)	59	908	285	88	800	174	363	97	141	410	236	381
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	64	987	310	96	870	189	250	308	153	352	389	414
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	946	423	105	946	423	422	443	376	422	443	376
Arrive On Green	0.06	0.26	0.26	0.06	0.26	0.26	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	64	987	310	96	870	189	250	308	153	352	389	414
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.4	18.0	12.1	3.6	16.1	6.7	8.5	10.2	5.5	12.7	13.6	16.0
Cycle Q Clear(g_c), s	2.4	18.0	12.1	3.6	16.1	6.7	8.5	10.2	5.5	12.7	13.6	16.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	946	423	105	946	423	422	443	376	422	443	376
V/C Ratio(X)	0.61	1.04	0.73	0.91	0.92	0.45	0.59	0.70	0.41	0.83	0.88	1.10
Avail Cap(c_a), veh/h	105	946	423	105	946	423	422	443	376	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.2	26.0	23.8	32.8	25.3	21.8	24.1	24.8	23.0	25.7	26.1	27.0
Incr Delay (d2), s/veh	23.3	41.0	10.7	65.9	15.2	3.4	6.0	8.7	3.2	17.5	21.2	76.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	14.5	6.7	3.8	10.1	3.4	5.0	6.5	2.8	8.5	9.8	15.2
LnGrp Delay(d),s/veh	55.5	67.0	34.5	98.7	40.5	25.2	30.1	33.5	26.2	43.2	47.2	103.1
LnGrp LOS	E	F	C	F	D	C	C	C	C	D	D	F
Approach Vol, veh/h		1361			1155			711			1155	
Approach Delay, s/veh		59.1			42.9			30.7			66.0	
Approach LOS		E			D			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	8.0	22.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		12.2	5.6	20.0		18.0	4.4	18.1
Green Ext Time (p_c), s		1.2	0.0	0.0		0.0	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	52.0
HCM 2010 LOS	D

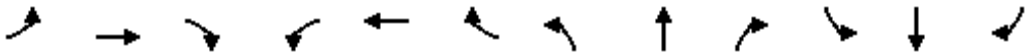
Notes

Appendix S.2 – Analysis Output Sheets (Mitigation - Future with Project Alternative 3 Existing SR-78)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	100	39	109	4	39	11	83	811	8	5	811	189
Future Volume (vph)	100	39	109	4	39	11	83	811	8	5	811	189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	16	12	12	16	16	12	12	16	16	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.96		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	0.97	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.97		1.00	1.00		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1708	1808		1770	2041		1770	1860		2006	1795	
Flt Permitted	0.72	1.00		0.53	1.00		0.15	1.00		0.24	1.00	
Satd. Flow (perm)	1298	1808		985	2041		279	1860		514	1795	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	109	42	118	4	42	12	90	882	9	5	882	205
RTOR Reduction (vph)	0	100	0	0	10	0	0	1	0	0	9	0
Lane Group Flow (vph)	109	60	0	4	44	0	90	890	0	5	1078	0
Confl. Peds. (#/hr)	16		11				10					10
Confl. Bikes (#/hr)			2									1
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.4	11.4		11.4	11.4		55.6	55.6		55.6	55.6	
Effective Green, g (s)	11.4	11.4		11.4	11.4		55.6	55.6		55.6	55.6	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.74	0.74		0.74	0.74	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	197	274		149	310		206	1378		381	1330	
v/s Ratio Prot		0.03			0.02			0.48			c0.60	
v/s Ratio Perm	c0.08			0.00			0.32			0.01		
v/c Ratio	0.55	0.22		0.03	0.14		0.44	0.65		0.01	0.81	
Uniform Delay, d1	29.4	27.9		27.1	27.6		3.7	4.8		2.5	6.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	0.4		0.1	0.2		6.6	2.4		0.1	5.4	
Delay (s)	32.8	28.3		27.2	27.8		10.3	7.2		2.6	11.7	
Level of Service	C	C		C	C		B	A		A	B	
Approach Delay (s)		30.1			27.7			7.5			11.7	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1239	25	0	0	0	0	12	32	57	45	0
Future Volume (vph)	36	1239	25	0	0	0	0	12	32	57	45	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		1.00						0.90			1.00	
Flt Protected		1.00						1.00			0.97	
Satd. Flow (prot)		3524						1679			1812	
Flt Permitted		1.00						1.00			0.80	
Satd. Flow (perm)		3524						1679			1498	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	1347	27	0	0	0	0	13	35	62	49	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	26	0	0	0	0
Lane Group Flow (vph)	0	1411	0	0	0	0	0	22	0	0	111	0
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		23.5						8.2			8.2	
Effective Green, g (s)		23.5						8.2			8.2	
Actuated g/C Ratio		0.59						0.21			0.21	
Clearance Time (s)		4.0						4.0			4.0	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		2085						346			309	
v/s Ratio Prot								0.01				
v/s Ratio Perm		0.40									c0.07	
v/c Ratio		0.68						0.06			0.36	
Uniform Delay, d1		5.5						12.7			13.5	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		0.9						0.1			0.7	
Delay (s)		6.4						12.7			14.2	
Level of Service		A						B			B	
Approach Delay (s)		6.4			0.0			12.7			14.2	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	39.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	71	394	290	84	780	168	257	128	80	206	268	184
Future Volume (veh/h)	71	394	290	84	780	168	257	128	80	206	268	184
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	77	428	315	91	848	183	209	237	87	224	291	200
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	841	376	132	894	400	448	470	400	422	443	376
Arrive On Green	0.02	0.08	0.08	0.07	0.24	0.24	0.24	0.24	0.24	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	77	428	315	91	848	183	209	237	87	224	291	200
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.9	7.8	13.2	3.4	15.9	6.6	6.8	7.4	3.0	7.5	9.5	7.5
Cycle Q Clear(g_c), s	2.9	7.8	13.2	3.4	15.9	6.6	6.8	7.4	3.0	7.5	9.5	7.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	841	376	132	894	400	448	470	400	422	443	376
V/C Ratio(X)	0.73	0.51	0.84	0.69	0.95	0.46	0.47	0.50	0.22	0.53	0.66	0.53
Avail Cap(c_a), veh/h	105	841	376	132	894	400	448	470	400	422	443	376
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.8	28.6	31.1	31.7	26.1	22.6	22.6	22.9	21.2	23.7	24.5	23.7
Incr Delay (d2), s/veh	35.7	2.2	19.4	25.7	20.0	3.7	3.5	3.8	1.2	4.7	7.4	5.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	4.2	8.1	2.7	10.5	3.4	3.9	4.4	1.5	4.3	6.0	3.9
LnGrp Delay(d),s/veh	69.5	30.8	50.5	57.5	46.0	26.3	26.1	26.7	22.4	28.4	31.9	29.0
LnGrp LOS	E	C	D	E	D	C	C	C	C	C	C	C
Approach Vol, veh/h		820			1122			533			715	
Approach Delay, s/veh		42.0			43.7			25.8			30.0	
Approach LOS		D			D			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		21.0	9.0	20.0		20.0	8.0	21.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		17.0	5.0	16.0		16.0	4.0	17.0
Max Q Clear Time (g_c+I1), s		9.4	5.4	15.2		11.5	4.9	17.9
Green Ext Time (p_c), s		1.5	0.0	0.4		1.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	37.2
HCM 2010 LOS	D

Notes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	870	282	87	766	169	359	97	140	400	235	371
Future Volume (veh/h)	58	870	282	87	766	169	359	97	140	400	235	371
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937	1937
Adj Flow Rate, veh/h	63	946	307	95	833	184	248	304	152	345	381	403
Adj No. of Lanes	1	2	1	1	2	1	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	105	946	423	105	946	423	422	443	376	422	443	376
Arrive On Green	0.06	0.26	0.26	0.06	0.26	0.26	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	1845	3681	1647	1845	3681	1647	1845	1937	1647	1845	1937	1647
Grp Volume(v), veh/h	63	946	307	95	833	184	248	304	152	345	381	403
Grp Sat Flow(s),veh/h/ln	1845	1840	1647	1845	1840	1647	1845	1937	1647	1845	1937	1647
Q Serve(g_s), s	2.3	18.0	11.9	3.6	15.2	6.5	8.4	10.1	5.5	12.4	13.2	16.0
Cycle Q Clear(g_c), s	2.3	18.0	11.9	3.6	15.2	6.5	8.4	10.1	5.5	12.4	13.2	16.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	105	946	423	105	946	423	422	443	376	422	443	376
V/C Ratio(X)	0.60	1.00	0.73	0.90	0.88	0.43	0.59	0.69	0.40	0.82	0.86	1.07
Avail Cap(c_a), veh/h	105	946	423	105	946	423	422	443	376	422	443	376
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	32.2	26.0	23.7	32.8	25.0	21.7	24.1	24.7	22.9	25.6	25.9	27.0
Incr Delay (d2), s/veh	22.5	29.1	10.3	63.9	11.5	3.2	5.9	8.4	3.2	16.0	19.2	66.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	12.9	6.6	3.7	9.1	3.3	5.0	6.4	2.8	8.2	9.3	14.2
LnGrp Delay(d),s/veh	54.8	55.1	34.1	96.7	36.5	25.0	30.0	33.1	26.1	41.7	45.1	93.5
LnGrp LOS	D	E	C	F	D	C	C	C	C	D	D	F
Approach Vol, veh/h		1316			1112			704			1129	
Approach Delay, s/veh		50.2			39.7			30.5			61.3	
Approach LOS		D			D			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.0	8.0	22.0		20.0	8.0	22.0
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0
Max Green Setting (Gmax), s		16.0	4.0	18.0		16.0	4.0	18.0
Max Q Clear Time (g_c+I1), s		12.1	5.6	20.0		18.0	4.3	17.2
Green Ext Time (p_c), s		1.3	0.0	0.0		0.0	0.0	0.5

Intersection Summary	
HCM 2010 Ctrl Delay	47.2
HCM 2010 LOS	D

Notes

Appendix H

Energy Consumption Worksheets

ESA

Complete Streets Improvements
Construction Energy Analysis

Construction Fuel Summary

164,567 gallons of diesel fuel for heavy-duty construction equipment
11,050 gallons of diesel fuel for haul trucks
6,887 gallons of diesel fuel for vendor trucks
11,385 gallons of fuel (primarily gasoline) for workers

182,504 Total Gallons Diesel
11,385 Total Gallons Gasoline

	State Fuel Consumption (2014, gallons)	Percent of Annual Project Compared to State
Diesel	3,400,000,000	0.0054%
Gasoline	14,400,000,000	0.0001%

Estimated Fuel Savings from Project Regulatory Compliance and Mitigation Measures

Estimated Diesel Fuel Savings from Anti-Idling Regulation:
8,298 gallons diesel fuel savings (total)

State fuel consumption data:
United States Energy Information Administration (USEIA), "Table F3: Motor Gasoline Consumption, Price, and Expenditure Estimates, 2015," http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_fuel/html/fuel_mg.html&sid=CA, accessed December 2016; "Table F7: Distillate Fuel Oil Consumption Estimates, 2015," http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sep_fuel/html/fuel_use_df.html&sid=CA, accessed December 2016.

Complete Streets Improvements
Construction Energy Analysis

Off-Road Equipment

Equipment ≤ 50 hp		
pounds fuel/hp-hr (OFFROAD2011 model, ≤ 50 hp):	0.408	lb/hp-hr
diesel pounds/gallon (CARB density assumption):	7.07	lb/gal
diesel gallons/hp-hr:	0.0577	gal/hp-hr
Total hp-hr for equipment ≤ 50 hp:	21,850	hp-hr
Total diesel gallons:	1,261	gal
Equipment > 50 hp		
pounds fuel/hp-hr (OFFROAD2011 model, > 50 hp):	0.367	lb/hp-hr
diesel pounds/gallon (CARB density assumption):	7.07	lb/gal
diesel gallons/hp-hr:	0.0519	gal/hp-hr
Total hp-hr for equipment > 50 hp:	504,088	hp-hr
Total diesel gallons:	26,167	gal
Total diesel gallons (off-road equipment):	**27,428**	**gal** **(1/6th of project)**
	164,567	**gal** **(full project)**

Phase	Equipment	Number	Hours/Day	HP	Load	Days	Total hp-hr
Proposed Project							
1 Demolition	Concrete/Industrial Saws	2	10	81	0.73	13	15,374
1 Demolition	Crushing/Proc. Equipment	2	10	85	0.78	13	17,238
1 Demolition	Excavators	2	10	162	0.38	13	16,006
1 Demolition	Rubber Tired Loaders	2	10	199	0.36	13	18,626
1 Demolition	Signal Boards	4	10	6	0.82	13	2,558
1 Demolition	Tractors/Loaders/Backhoes	2	10	97	0.37	13	9,331
2 Site Preparation	Excavators	2	10	162	0.38	13	16,006
2 Site Preparation	Rubber Tired Loaders	2	10	199	0.36	13	18,626
2 Site Preparation	Signal Boards	4	10	6	0.82	13	2,558
2 Site Preparation	Tractors/Loaders/Backhoes	2	10	97	0.37	13	9,331
3 Grading	Excavators	2	10	162	0.38	13	16,006
3 Grading	Plate Compactors	2	10	8	0.43	13	894
3 Grading	Rubber Tired Loaders	2	10	199	0.36	13	18,626
3 Grading	Signal Boards	4	10	6	0.82	13	2,558
3 Grading	Tractors/Loaders/Backhoes	2	10	97	0.37	13	9,331
4 Utility Trenching	Tractors/Loaders/Backhoes	2	10	97	0.37	13	9,331
4 Utility Trenching	Trenchers	2	10	80	0.5	13	10,400
5 Building Construction	Excavators	2	10	162	0.38	25	30,780
5 Building Construction	Plate Compactors	2	10	8	0.43	25	1,720
5 Building Construction	Rubber Tired Loaders	2	10	199	0.36	25	35,820
5 Building Construction	Signal Boards	4	10	6	0.82	25	4,920
5 Building Construction	Tractors/Loaders/Backhoes	4	10	97	0.37	25	35,890
6 Paving	Excavators	2	10	162	0.38	25	30,780
6 Paving	Forklifts	2	10	89	0.2	25	8,900
6 Paving	Graders	2	10	174	0.41	25	35,670
6 Paving	Pavers	2	10	125	0.42	25	26,250
6 Paving	Paving Equipment	4	10	130	0.36	25	46,800
6 Paving	Plate Compactors	2	10	8	0.43	25	1,720
6 Paving	Rollers	2	10	80	0.38	25	15,200
6 Paving	Rubber Tired Loaders	2	10	199	0.36	25	35,820
6 Paving	Signal Boards	4	10	6	0.82	25	4,920
6 Paving	Tractors/Loaders/Backhoes	2	10	97	0.37	25	17,945
		(1/6th of project)		Total hp-hr for equipment ≤ 50 hp:			21,850
		(1/6th of project)		Total hp-hr for equipment > 50 hp:			504,088

Complete Streets Improvements
Construction Energy Analysis

On-Road Haul Trucks

EMFAC2014 Diesel Fuel Consumption Factor:[1]	0.1715	gallons/mile		
Total Haul Truck VMT:	9,580	miles		
Total VMT diesel gallons (on-road haul trucks):	**1,643**			
EMFAC2014 Diesel Fuel Consumption Factor:[2]	1.6569	gallons/hour		
Total Haul Truck Idle-Hours per Year:	120	hours		
Total Idling diesel gallons (on-road haul trucks):	**198**			
Total diesel gallons (on-road haul trucks):	**1,842**	gal	**(1/6th of project)**	
	11,050	gal	**(full project)**	

Estimated Fuel Savings from Anti-Idling Regulation (64 percent based on estimated CARB emissions reductions):[3]

(1/6th of project)	*551*
(full project)	*3,307*

1. California Air Resources Board, EMFAC2014 (San Diego Air Basin; T7 Single Construction; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (San Diego Air Basin; T7 Single Construction; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, https://www.arb.ca.gov/regact/idling/idling.htm, accessed November 2016.

Phase	Days	Total One-Way Trips	Miles/Trip	VMT	Idle Hours
Proposed Project					
1 Demolition	13	-	-	-	-
2 Site Preparation	13	375	20	7,500	94
3 Grading	13	104	20	2,080	26
4 Utility Trenching	13	-	-	-	-
5 Building Construction	25	-	-	-	-
6 Paving	25	-	-	-	-
	(1/6th of project)		Total Haul Truck VMT:	9,580	
	(1/6th of project)		Total Idle-Hours:		120

Complete Streets Improvements
Construction Energy Analysis

On-Road Vendor Trucks

EMFAC2014 Diesel Fuel Consumption Factor:[1]	0.1541	gallons/mile		
Total Vendor Truck VMT:	5,504	miles		
Total VMT diesel gallons (on-road vendor trucks):	**848**			
EMFAC2014 Diesel Fuel Consumption Factor:[2]	1.5889	gallons/hour		
Total Vendor Truck Idle-Hours per Year:	189	hours		
Total Idling diesel gallons (on-road vendor trucks):	**299**			
Total diesel gallons (on-road vendor trucks):	**1,148**	gal	**(1/6th of project)**	
	6,887	gal	**(full project)**	

Estimated Fuel Savings from Anti-Idling Regulation (64 percent based on estimated CARB emissions reductions): [3]

(1/6th of project)	*832*
(full project)	*4,992*

1. California Air Resources Board, EMFAC2014 (San Diego Air Basin; HHDT and MHDT; Annual; CY 2017; Aggregate MY; Aggregate Speed)
2. California Air Resources Board, EMFAC2014 (San Diego Air Basin; HHDT and MHDT; Annual; CY 2017; Aggregate MY; 5 miles per hour converted to hourly rate)
3. Source: California Air Resources Board (CARB), 2004. Staff Report: Initial Statement of Reasons for Proposed Rulemaking, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling, Appendix F, July 2004, https://www.arb.ca.gov/regact/idling/idling.htm, accessed November 2016.

Phase	Days	One-Way Trips/Day	Miles/Trip	VMT	Idle Hours
Proposed Project					
1 Demolition	13	2	7.3	190	7
2 Site Preparation	13	2	7.3	190	7
3 Grading	13	2	7.3	190	7
4 Utility Trenching	13	2	7.3	190	7
5 Building Construction	25	24	7.3	4,380	150
6 Paving	25	2	7.3	365	13
	(1/6th of project)		Total Vendor Truck VMT:	5,504	
	(1/6th of project)		Total Idle-Hours:		189

Complete Streets Improvements
Construction Energy Analysis

On-Road Workers (LDA, LDT1, LDT2)

EMFAC2014 Gasoline Fuel Consumption Factor:[1]	0.0418	gallons/mile	
Total Worker VMT:	45,360	miles	
Total gasoline gallons (workers):	**1,898**		
Total gasoline gallons with Savings (workers):	**1,898**	gal	**(1/6th of project)**
	11,385	gal	**(full project)**

1. California Air Resources Board, EMFAC2014 (San Diego Air Basin; LDA, LDT1, LDT2; CY 2017; Aggregate MY; Aggregate Speed)

Phase	Days	One-Way Trips/Day	Miles/Trip	VMT
Proposed Project				
1 Demolition	13	35	10.8	4,914
2 Site Preparation	13	25	10.8	3,510
3 Grading	13	30	10.8	4,212
4 Utility Trenching	13	10	10.8	1,404
5 Building Construction	25	56	10.8	15,120
6 Paving	25	60	10.8	16,200
	(1/6th of project)		Total Worker VMT:	45,360

Appendix I
Incentive District Ordinance

ESA

Article 12C Coast Highway Incentive District (Incentive District).

Sections:

1201 Purpose and Intent
1202 Applicability
1203 Administration
1204 Regulating Plan
1205 Mixed-Use Standards
1206 Residential Incentive Program
1207 Land Use Standards
1208 Urban Standards
1209 Architectural Standards
1210 Large Lot Standards
1211 Parking Standards
1212 Definitions

1201 Purpose and Intent

The specific purposes of the Coast Highway Incentive District (Incentive District) are to:

A. Incent redevelopment and revitalization of the Incentive District by streamlining the development review process and providing development incentives.

B. Encourage sustainable, high-quality development consistent with the intent and objectives articulated in the Coast Highway Vision and Strategic Plan.

C. Create distinct pedestrian-oriented subareas, including:

1. Urbane mixed-use nodal areas featuring relatively intense commercial land use and residential density; development in these nodal areas will generally be taller and more street-adjacent than development in other subareas; commercial uses, including visitor-serving businesses, will provide a wide range of employment opportunities.

2. Commercial Villages featuring neighborhood-serving commercial uses in a suburban main street setting; these villages also allow for mixed-use development, consistent with underlying zoning standards.

3. Transitional Avenue segments featuring a combination of mixed-use, standalone commercial, and standalone residential development with generally less land use intensity and residential density relative to nodal areas; providing for auto-related uses, these segments are characterized by more expansive setbacks and landscaping.

D. Promote high-quality urban and architectural design and variability of massing and height, emphasizing the design of the interface between the private and public realms.

E. Facilitate the creation of vibrant community places and tourist destinations.

F. Treat Coast Highway as a complete, multi-modal street that is safe, pedestrian and bicycle friendly, accessible, attractive, visually and functionally engaging for users of all ages and abilities, and well integrated with adjoining neighborhoods along the corridor.

1202 Applicability

A. Applicability and Zoning Map Designator

The Incentive District is an *optional* development tool to meet the purpose and intent as described in Section 1201, and may be used to develop any parcel within the Incentive District (Map 1). When an applicant voluntarily decides to develop consistent with the Incentive District standards, these standards shall supersede underlying zoning standards.

B. Rules for Interpretation

Section 240 Rules for Interpretation of Article 2 Organization, Applicability, and Interpretation of the 1992 Ordinance shall apply.

C. Severability

Section 220 (L) Severability of Article 2 Organization, Applicability, and Interpretation of the 1992 Ordinance shall apply.

1203 Administration

A. Administrative Development Plan review is required for the following:

1. New or redevelopment proposals with 43 dwelling units per acre or less, or developments with no residential component.
2. Subdivisions and land assemblages.

B. Development Plan review is required for the following:

1. Development proposals greater than 43 dwelling units per acre.
2. Development proposals greater than 45 feet in height.
3. Development proposals subject to Large Lot Standards stipulated in Section 1210.

C. Conditional Use Permits are required for the following:

Land uses subject to a Conditional Use Permit per Table 2, Section 1207.

D. Overview of Permits Required

Table 1 provides an overview of the permits required, the review authority, and the appeal authority within the Incentive District.

Table 1. Applications and Review Authority

Permit Type	Reviewing Authority	Appealable/Appeal Authority
Administrative Development Plan Permit	City Planner Administrative Decision	Yes/Planning Commission
Development Plan Permit	Planning Commission	Yes/City Council
Conditional Use Permit	Planning Commission	Yes/City Council

E. Administrative Development Plan Review

1. Review Authority

   The City Planner shall approve, conditionally approve, or deny applications for Administrative Development Plan Permits based on considerations of the standards of this article.

2. Review and Decision

   a. The City Planner shall approve an Administrative Development Plan Permit if the proposed development complies with applicable development standards, and meets the required findings in Section 1203 E (3), below.

   b. The City Planner may require review by any other City department or division or governmental agency deemed necessary.

   c. The City Planner shall prepare a written decision which shall contain the findings of fact upon which such decision is based. A copy of the decision shall be mailed to the applicant at the address shown on the application within 14 calendar days after the decision is made.

3. Required Finding

   An Administrative Development Plan Permit may be granted if the City Planner finds that the project, as submitted or modified, is consistent with the intent and objectives of the Coast Highway Vision and Strategic Plan, the General Plan, and the Local Coastal Program and complies with the applicable standards of this article.

4. Conditions

   In granting an Administrative Development Plan Permit, the City Planner or the Review Authority on appeal may impose reasonable conditions to protect the public health, safety, and general welfare and secure the intent and objectives of

the Coast Highway Vision and Strategic Plan, the General Plan, the Local Coastal Program, and this article, and to support the required findings of approval.

5. Other Standards

Administrative Development Plan Permits shall comply with the standards of Article 43 Development Plan Review of the 1992 Ordinance, specifically: Sections 4303 Initiation of Development Plan Review; 4304 Application for Development Plan; 4305 Notice Administrative Hearing and Public Hearing; and 4308 Effective date, Lapse of Approvals, Time Extension, and Changed Plans.

F. Development Plan Review

1. Review Authority

The Planning Commission shall approve, conditionally approve, or deny applications for Development Plan Permits based on consideration of the standards of this article.

2. Required Findings

A Development Plan Permit shall be granted only if the Planning Commission determines that the project as submitted or modified, complies with the following criteria:

a. That the proposed project is consistent with the intent and objectives of the Coast Highway Vision and Strategic Plan, the General Plan, and the Local Coastal Program.

b. That the physical location, size, massing, setbacks, pedestrian orientation, and placement of proposed structures on the site and the location of proposed uses within the project comply with applicable standards and are consistent with the purpose and intent of the Incentive District.

c. That any proposed extension of rights-of-way and/or onsite circulation can accommodate autos, bicycles, pedestrians, and multi-modal transportation methods, including adequate vehicle and bicycle parking and pedestrian access.

d. That the area covered by the application can be adequately, reasonably, and conveniently served by existing and/or planned public services, utilities, and public facilities.

e. That any community benefits have been provided in accordance with Section 1204.

3. Conditions

In granting a Development Review Permit, the Planning Commission or the Review Authority on appeal may impose reasonable conditions to protect the public health, safety, and general welfare and secure the intent and objectives of

the Coast Highway Vision and Strategic Plan, the General Plan, the Local Coastal Program, and this article, and to support the required findings of approval.

4. Other Standards

   Development Plan Permits shall comply with the standards of Article 43 Development Plan Review of the 1992 Ordinance, specifically: Sections 4303 Initiation of Development Plan Review; 4304 Application for Development Plan; 4305 Notice Administrative Hearing and Public Hearing; and 4308 Effective date, Lapse of Approvals, Time Extension, and Changed Plans.

G. Conditional Use Permit

   Conditional Use Permits shall be processed in accordance with Article 41 of the 1992 Ordinance.

H. Appeals

1. Rights of Appeal and Review

   Rights of appeal and review procedures shall be as prescribed by Article 43 Development Plan Review of the 1992 Ordinance, specifically Section 4309 (A) and (B), except that any filing for an appeal shall include the grounds for appeal and supporting documentation in compliance with Section 1203 (H), 2 and 3, of this article.

2. Grounds for Appeal

   All appeals shall be filed with the following supporting documentation.

   a. Factual Error. The statements or evidence relied upon by the decision maker when approving, conditionally approving, or denying a permit, map, or other matter were inaccurate.

   b. New Information. New information is available to the applicant or the interested person that was not available through reasonable efforts or due diligence at the time of the decision.

   c. Findings not supported. The decision maker's stated findings to approve, conditionally approve, or deny the permit, map, or other matter are not supported by the information provided to the decision maker.

   d. Conflicts. The decision to approve, conditionally approve, or deny the permit is in conflict with the intent and objectives of the Coast Highway Vision and Strategic Plan, General Plan, Local Coastal Program, and applicable development standards.

3. Insufficient Appeal

   An insufficient appeal shall be returned to the appellant.

I. Incentive District Boundary Adjustments

1. Minor adjustments to the Incentive District boundary and identified subareas may be approved by the City Planner subject to the following findings:

   a. Parcels must be included within the Coastal Zone boundary.

   b. Parcels are contiguous to the Incentive District or identified subarea and the addition of the parcel(s) would result in a project that equally or better meets the purpose and intent of the Incentive District.

   c. All other adjustments will require an amendment to the Incentive District.

J. Periodic Review and Maintenance

To ensure progress toward achieving the intent and objectives articulated in the Coast Highway Vision and Strategic Plan, General Plan, and Local Coastal Program, the Planning Commission will periodically review the Incentive District boundaries and this Article and recommend changes.

1204 Regulating Plan

A. Applicability

The Regulating Plans for this article are depicted in the following maps:

- Map 2 Subarea Plan
- Map 3 Setback Regulating Plan

B. Purpose of the Subarea Plan

The Subarea Plan (Map 2) divides the Incentive District into five subareas, with each subarea assigned place-specific development standards. The purpose of each subarea is described in Section 1201(c).

C. Purpose of Setback Plan

The Setback Plan (Map 3) establishes minimum and maximum setbacks along the primary frontage of all parcels within the Nodes and Commercial Village subareas and minimum setbacks along the primary frontage of all parcels within the Avenue subareas.

D. Setback Standards

The primary frontage is provided on Map 3 for guidance purposes only. The City Planner shall make the final determination as to which parcel line(s) serves as the primary frontage of each project site. The City Planner shall use the following criteria in making this determination:

1. Primary frontages shall be applied to properties abutting Coast Highway.

2. For parcels not abutting Coast Highway, primary frontages shall be those abutting streets that parallel Coast Highway.

3. For parcels not abutting Coast Highway with frontages on more than one street running parallel to Coast Highway, the orientation of existing development on the same city block shall determine the primary frontage.
4. For properties on Wisconsin Avenue and south of Coast Highway, primary frontages shall be those abutting Wisconsin Avenue.
5. Front yard setbacks along the primary frontage as shown on Map 3:
    a. Avenues. Minimum 5 feet for mixed-use/ground-floor commercial and 10-foot minimum for standalone residential; 10-foot maximum for mixed-use/ground-floor commercial and 20-foot maximum for standalone residential.
    a. Commercial Villages. Minimum 3 feet and 8-foot maximum.
    b. Nodes. No minimum and 10-foot maximum.
6. Side yard setbacks:
    a. Corner lots in all sub areas: Consistent with applicable minimum and maximum front yard setbacks.
    b. Interior lots in all sub areas with at least one frontage along a primary frontage identified on Map 3: No required minimum or maximum.
    c. For all other interior lots in all sub areas: Minimum 10 percent of lot width, not less than 3 feet and not more than 5 feet.
7. Rear yard setbacks:
    a. Properties in all sub areas not abutting a residential zoning district: No required minimum or maximum.
    b. For properties abutting residential zoning districts: Minimum 15 feet, unless abutting an alley, then minimum 5 feet.

1205 Mixed-Use Standards

A. Purpose

This section establishes the minimum standards for commercial space within mixed-use developments.

B. Mixed-Use Commercial Floor Area

1. For mixed-use projects on lots 60,000 sf and smaller, the Floor Area Ratio devoted to commercial space shall be a minimum of 0.20.
2. For mixed-use projects on lots greater than 60,000 sf, the Floor Area Ratio devoted to commercial space shall be a minimum of 0.25.

C. Commercial Uses

1. Required commercial spaces shall contain commercial land uses that serve clients and patrons that will visit the site. These spaces may not be used for storage or in the same manner as home occupancy businesses.

2. Commercial land uses in mixed-use projects include the following major land use categories; artisan manufacturing, bars and cocktail lounges, craft breweries and wineries, child care, commercial recreation and entertainment-indoor, cultural institutions, financial services, food and beverage sales, offices business and professional, park and recreation facilities, personal improvement services, personal services, restaurants, retail, studios, and visitor accommodations.

1206 Residential Incentive Program

A. Purpose

1. The purpose of this section is to establish regulations that will allow new development to exceed the maximum residential densities of the underlying zoning district in exchange for community benefits, or to implement stand-alone residential use in the Avenue subareas.

2. These regulations require that projects approved above the maximum residential density must implement community benefits within one or more of the categories in Section 1206 (C), below.

B. Applicability

1. The provisions of this Chapter shall apply to the nodal subareas as shown in Map 4, Residential Incentive Program Area.

2. Nodes. Residential use in nodal areas is permitted as a component of mixed-use development that meets minimum commercial standards as specified in Section 1205. Development in nodal areas may exceed the maximum residential density up to a maximum of 63 dwelling units per acre through the provision of certain community benefits as further described in Section 1206 (C), below.

3. Avenue Segments. Development in Avenue segments may not exceed the residential density allowance of the underlying zoning district.

C. Residential Density Incentive for Nodal Development

1. In nodal areas, projects can earn additional density above the underlying residential density allowance in exchange for one or more of the following community benefits provided per unit above 43 dwelling units per acre.

   a. Public Improvement Fee. Projects can gain additional density up to a maximum of 63 dwelling units per acre through payment of a per-unit public improvement fee. Said fee shall be set and adjusted by the City Council and shall provide for public improvements within the Incentive District.

b. Public Open Space. Projects can gain additional density up to a maximum of 63 dwelling units per acre through the provision of public open space at a minimum ratio of 200 square feet (sf) per unit. Public open space provided in exchange for residential density must comply with the following standards:

i. Projects shall provide a minimum of 1,000 sf of public open space.

ii. The minimum dimensions of public open space shall comply with the standards applicable to the building type as provided in Section 1208 (D).

iii. Open space shall be owned, operated, and maintained by the developer or property manager in accordance with an approved maintenance plan.

iv. Open space shall be directly accessible from the public right-of-way.

v. Open space shall be accessible to persons with disabilities.

vi. Open space shall be on the ground level.

vii. No more than 20 percent of open space shall be occupied by above-grade structures.

viii. Open space shall be open to the public, without charge, each day of the year from 6:00 a.m. to 10:00 p.m., except for temporary closures for necessary maintenance or compelling public safety concerns identified in coordination with the Oceanside Police Department.

ix. At a minimum, the following elements shall be included within the open space:

- Trees and landscaping.
- Seating.
- Refuse and recycling receptacles.
- Signage identifying the open space as open to the public and specifying hours of operation.

x. Open space may be provided off-site, subject to approval by the City Planner.

xi. Off-site open space shall comply with the following standards:

- The open space shall be within 1,320 feet of the project site.
- The open space shall be dedicated and improved concurrent with the project benefiting from bonus residential density.
- The open space may be either publicly or privately maintained subject to agreement with the City.

c. Public Parking. Projects can gain additional density up to a maximum of 63 dwelling units per acre through the provision of a minimum number of public parking spaces per unit in compliance with the following standards:

i. One parking space per unit.

ii. The total number of additional parking spaces must equal at least 10 percent of the total minimum parking spaces required under Section 1211.

iii. A public parking easement shall be executed for these facilities to the satisfaction of the City Planner and City Attorney.

d. Increased Commercial Floor Area. Projects can gain additional density up to a maximum of 63 dwelling units per acre through the provision of additional ground floor commercial floor area above the minimum commercial floor area standard established in Section 1205 (B). A total of 250 sf of additional ground floor commercial space shall be provided per unit.

2. The Residential Incentive Program shall be periodically reviewed by the Planning Commission as described in Section 1203 (J) to ensure the public benefits provided in exchange for residential density continue to be equitable and desirable by the community.

D. Standalone Residential in Avenues

Standalone residential development shall be permitted in Avenues in compliance with the maximum density of the underlying zoning district. No community benefit per Section 1206(c) above, is required.

1207 Land Use Standards

A. Purpose

Allowed land uses are provided in Table 2, Land Use and Permit Standards. The land use regulations shall be reviewed as part of periodic reviews described in Section 1203 (J) to ensure a balanced mix.

B. Applicability

Land uses shown in the table are allowed in the subarea specified. Uses not included in the table are considered prohibited unless determined by the City Planner to be substantially similar to another permitted or conditionally permitted use. Each land use in the table corresponds to a definition listed in Section 1212.

C. Land Use and Permit Standards

Table 2. Land Use and Permit Standards

Use[1]	Avenue	Commercial Village	Node
Animal Sales and Services	P	P	P
Artisan Manufacturing	P	P	P
Assembly/Meeting Facility	C	C	P
Bars and Cocktail Lounges	C(4)	C(4)	C(4)
Breweries, Craft	Variable (10)	Variable (10)	Variable (10)
Child Care	P	P	P
Commercial Recreation and Entertainment – Indoor	P(4)	P(4)	P(4)
Cultural Institutions	P	P	P
Financial Services	P(2)	P(2)	P(3)
Food and Beverage Sales	P(4)	P(4)	P(4)
Hospitals	C	C	P
Offices, Business and Professional	P(2)	P(2)	P(3)
Parking as a primary use	P(5)	P(5)	P(5)
Park and Recreation Facilities	P	P	P
Personal Improvement Services	P(4)	P(4)	P(4)
Personal Services	P(4)	P(4)	P(4)
Residential	P(6)	P(6)(7)	P(7)(8)
Restaurants, Fast Food	P(2)	P(2)	P(3)
Restaurants, Full Service	P(4)	P(4)	P(4)
Retail	P(2)	P(2)	P(2)(4)
Schools	C	C	C
Studios	P	P	P
Theater	C	C	P
Vehicle/Equipment Sales and Services	P	C	-
Visitor Accommodations	P	P	P
Wineries, Craft	Variable (10)	Variable (10)	Variable (10)
Other[9]	C	C	C

Notes: "P" denotes that the use is permitted.

"C" denotes that the use is permitted with the approval of a Conditional Use Permit pursuant to Article 41 of the 1992 Ordinance.

"-" denotes that the use is not permitted.

"(numbers, such as '1')" denote that the land use is subject to additional use regulations which are provided after the table.

D. Additional Land Use Regulations

1. All uses must meet City noise and emissions standards per Oceanside Municipal Code Chapter 38. The City Planner may establish project-specific conditions of approval to minimize noise, including conditions to soundproof facilities, limited operating hours, and/or limited facility size.

2. Any drive-through facilities require approval of a Conditional Use Permit in accordance with Article 41 of the 1992 Ordinance.

3. Drive-through facilities are prohibited in Nodes.

4. Certain uses within this land use category are subject to standards in Article 36 Separation of Regulated Uses of the 1992 Ordinance. See Section 1212 Definitions of this article for identification of these uses.

5. Parking as a primary use must be made publically available and shall comply with appropriate provisions of Section 1211 and applicable provisions of Article 31 of the 1992 Zoning Ordinance, including Section 3120 additional design standards for parking lots and structures.

6. Residential density may not exceed 43 units per acre.

7. Residential shall only be permitted in conjunction with another permitted use.

8. Residential density may not exceed 43 units per acre unless the project complies with the Residential Incentive Program per Section 1204 and is subject to approval of a Development Plan Permit per Section 1203.

9. Any use that is not listed in Table 2 and defined in Section 1212 is considered "Other" and requires a Conditional Use Permit in accordance with Article 41 of the 1992 Ordinance.

10. Definitions, performance standards, and review processes for craft breweries and wineries are provided in Section 414 of Article 4 of the 1992 Ordinance.

1208 Urban Standards

A. Purpose

The Urban Standards define the design of the built environment in the Incentive District, placing emphasis on the design of the street frontage where private development meets the public street. The Urban Standards vary by subarea and are further described in Table 3 below.

B. Applicability

This section applies to all areas within the Incentive District.

C. Urban Standards by Subarea

Table 3. Urban Standards by Subarea

Location	Allowable Building Types	Allowable Frontage Types	Maximum Height	Minimum Frontage Occupancy[2]
Node	• Live/Work • Mixed Use • Courtyard Complex • Podium • Wrap Building • Special Type Buildings	• Arcade/Gallery • Shopfront • Dooryard • Live/Work • Stoop • Forecourt	45 feet or four stories May exceed height limit subject to additional provisions[1]	90%
Commercial Village	• Main St. Retail/Office • Live/Work • Mixed Use • Courtyard Complex • Podium • Wrap Building • Special Type Buildings	• Arcade/Gallery • Shopfront • Live/Work • Dooryard • Stoop • Forecourt	45 feet or four stories	70%
Avenue	• Main St. Retail/Office • Live/Work • Courtyard Apartment • Condo Complex • Podium • Wrap Building • Townhouse • Stacked dwelling • Special Type Buildings	• Arcade/Gallery • Live/Work • Shopfront • Avenue-Commercial • Avenue-Residential • Dooryard • Stoop • Forecourt	45 feet or four stories	60%

Notes:

1) Projects may exceed the height limit up to a maximum of 65 feet, with a maximum average height of 55 feet, subject to approval of a Development Plan Permit pursuant to Section 1203 (F).

2) An exception to the minimum frontage occupancy standard may be granted by the City Planner where significant urban or architectural features or contributions to the public realm are offered. Such public realm features may include, but are not limited to publicly accessible open space, such as a courtyard or plaza or residential entry alcoves or stoops that contribute to the public realm by adding detail and enhancing the relationship to the street. The following additional standards apply:

   a. Any open space provided must comply with the open space standards in Section 1208.

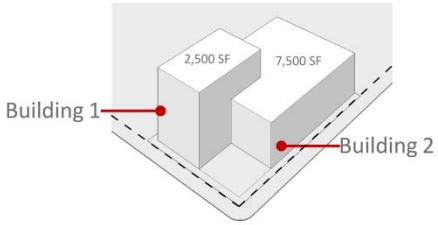
   b. The open space may include outdoor dining areas, but the overall space must be accessible to the public and enhance the public realm.

   c. The urban, architectural, or public realm features must be of exceptional, high-quality design.

   d. The urban, architectural, or public realm features will not compete with other similar features or spaces on that block so as to detract from an inviting, pedestrian-friendly environment.

Figure 1. Calculating Maximum Average Height

Step One



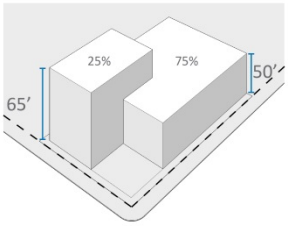
$$\frac{\text{Building 1 Roof Area (SF)}}{\text{Building 1 Roof Area (SF) + Building 2 Roof Area (SF)}} = \text{Building 1 Percentage (B1\%)}$$

Ex: $\frac{2{,}500}{2{,}500 + 7{,}500} = 25\%$

$$\frac{\text{Building 2 Roof Area (SF)}}{\text{Building 1 Roof Area (SF) + Building 2 Roof Area (SF)}} = \text{Building 2 Percentage (B2\%)}$$

Ex: $\frac{7{,}500}{2{,}500 + 7{,}500} = 75\%$

Step Two



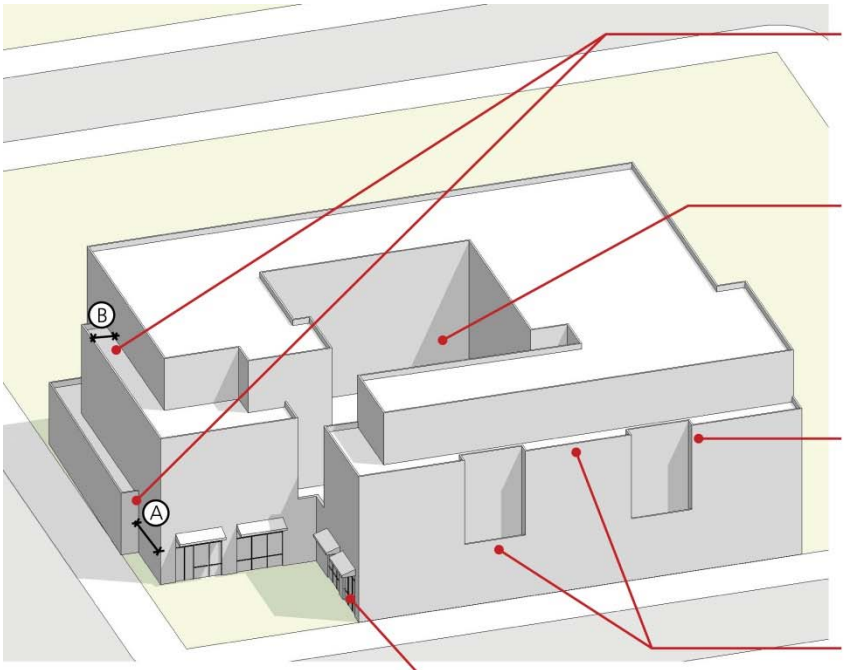
(Building 1 Height (FT) x B1%) + (Building 2 Height (FT) x B2%) = Average Height (FT)

Ex: (65' x .25) + (50' x .75) = 55'

D. Building Types

Building type standards address key building elements as illustrated in Figure 2. Calculating the maximum allowed footprint per story is illustrated in Figure 3.

Figure 2. Key Building Elements



Plane Break:

The area of the building where the plane of the facade varies in depth, represents a plane break. Plane breaks can be horizontal (see A left) or vertical (see B left).

Outdoor Space:

Each building type requires the lot area to be occupied by a certain percentage of green space area, which can be accommodated in a variety of ways, for instance through gardens, yards, patios, courtyards, etc. as described on each building type page.

Maximum Footprint per Story:

The floor area of upper stories shall be less than the area of the building footprint at grade as indicated by the maximum allowed footprint per story charts on each building type page.

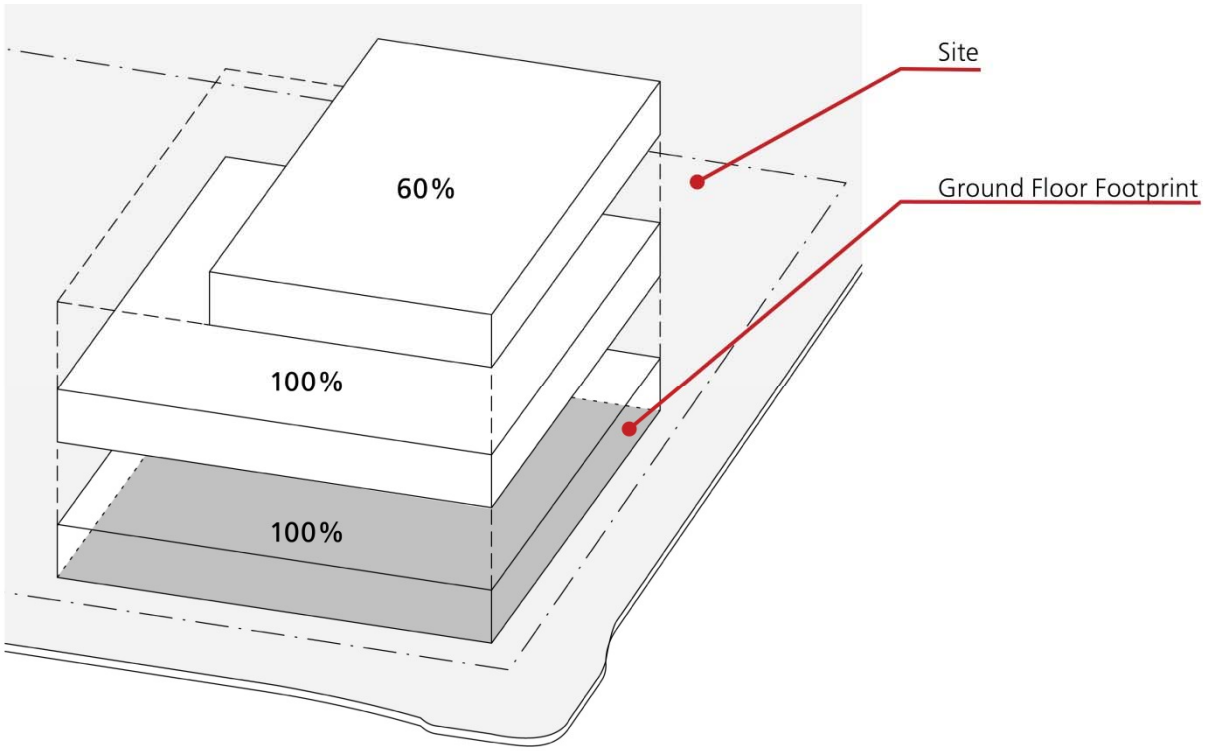
Maximum Upper Level Building Frontage Occupancy:

Some building types have limitations on the percentage of the building front that can be occupied above 45 feet in height. A standard may limit upper levels to 80% of a frontage, requiring either a break in frontage or a setback of the building face by a minimum of eight feet.

Frontage Type:

Each building has certain facade conditions that are called frontage types. Each front-age interacts differently with the street and therefore is appropriate for different areas and building types.

Figure 3. Maximum Allowed Footprint per Story



The maximum footprint per story is computed based on the building's ground floor footprint, not the overall site area.

1. Main Street Retail/Office



Three-dimensional diagram

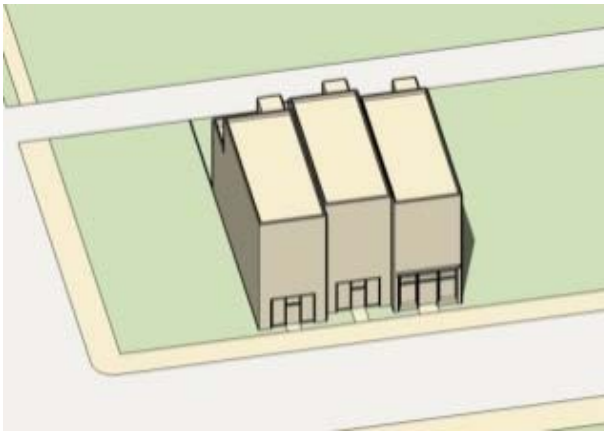


Example of Main Street Retail/Office

Intent Statement
A building designed for occupancy by retail, service, and/or office.
Location
• Commercial Village • Avenue
Building Height
25 feet min. or 1 story with mezzanine
Maximum Facade Width
50 feet
Maximum Upper-Level Frontage Occupancy
Not Applicable
Maximum Allowed Footprint per Story
Not Applicable
Primary Facades
• Street-facing
Landscaping
• Hardscape and potted plants, only, for front yards. • Landscape materials to be approved by the City.

Open Space		
• When provided, open space shall be at least 10 feet in length.		
Primary Frontage Types		
• Arcade/Gallery • Stoops • Shopfront		
Primary Entry Location		
• Street		
Parking		
Type	Surface	At rear of lot
	Above-Grade	Concealed from street view behind bldg.
Access	Alley	Preferred
	Secondary Street	Permitted when alleys are not present

2. Live/Work



Three-dimensional diagram



Example of Live/Work buildings

Intent Statement
An integrated residence and work space, occupied by a single unit. Often two or more such units shall be arranged side by side along the principal frontage that has been designed or structurally modified to accommodate joint residential and work occupancy. Live/work buildings may also wrap the podium of a high-rise building type. To ensure an appropriate ratio of residence to work space, the following standards must be met: • The minimum size of a single unit is 470 sf. The maximum size of a single unit is 5,000 sf. • The residential area of a unit may not exceed the lesser of 50% of the total unit size.
Location
• Node • Avenue • Commercial Village
Building Height

Min.	25 feet or 2 stories
Max.	50 feet or 4 stories in Node

Maximum Facade Width	
Max.	30 feet per unit; 10 units per facade string

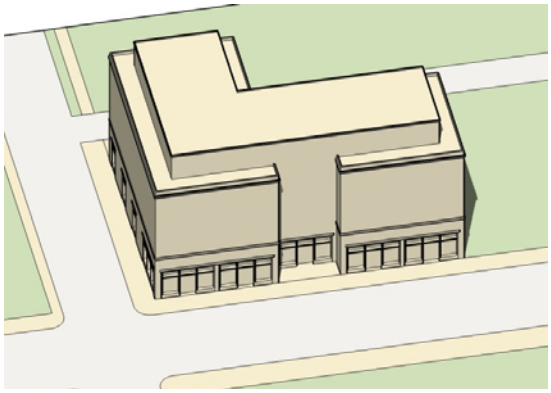
Maximum Upper-Level Frontage Occupancy
Not Applicable
Maximum Allowed Footprint per Story

Stories	1	2	3	4
2	100%	100%	-	-
3	100%	100%	80%	-
4	100%	100%	80%	80%

Primary Facades
• Street-facing
Landscaping
• Landscaping may not visually obstruct Shopfront or work space. • Front yard landscaping shall primarily include hardscapes and potted plants.
Open Space
• When provided open space shall be at least 10 feet in dimension.
Primary Frontage Types
• Arcade/Gallery • Shopfront • Live/Work • Stoops
Primary Entry Location
Street; except residential entries may be accessed through work space, through a paseo between units, or from the rear
Parking

Type	Surface	At rear of lot
	Above-Grade	Concealed from street view behind bldg.
Access	Alley	Preferred
	Secondary Street	Permitted when alleys are not present

3. Mixed Use



Three-dimensional diagram



Example of Mixed-Use Building

Intent Statement
A building designed for occupancy by retail, service, office, and/or residential uses on the ground floor, with upper floors also configured for office and/or residential uses; however two-story retail is permitted as long as the development complies with applicable mixed-use standards in Section 1206.
Location
• Node • Commercial Village
Building Height

Min.	2 stories

Façade Width	
Max.	225 feet; >175 feet must have at least 1 facade break of at least 20 feet in length and 10 feet in depth

Maximum Upper-Level Frontage Occupancy
Portions of facades above 45 feet in height and greater than 150 feet in length shall occupy no more than 80% of the primary facade plane established on the ground floor (see Figure 3).

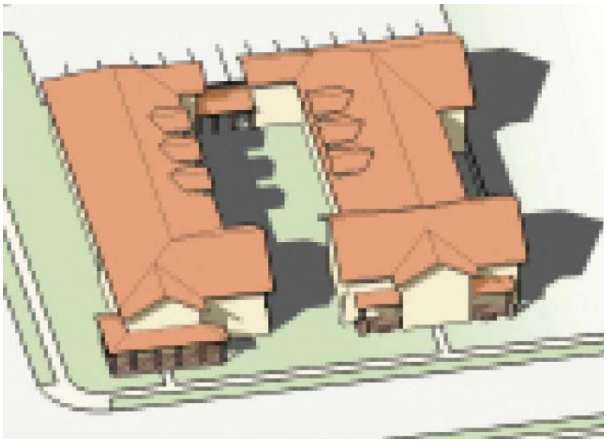
Maximum Allowed Footprint per Story			
Stories	1-3	4	5
2-3	100%	-	-
4-5	100%	85%	55%

Primary Facades
Street-facing

Landscaping
• Landscaping may not visually obstruct Shopfront or office or retail space. • Front yard landscaping shall primarily include hardscapes and potted plants.
Open Space
• When provided, open space shall be at least 10 feet in dimension.
Primary Frontage Types
• Arcade/Gallery • Shopfront
Primary Entry Location
Street; Primary entrances to upper floors shall be accessed through an interior courtyard or a lobby which is accessed directly from the street
Parking

Type	Surface	At rear of lot
	Above-Grade	Concealed from street view behind bldg.
Access	Alley	Preferred
	Secondary Street	Permitted when alleys are not present

4. Courtyard Complex



Three-dimensional diagram



Example of Courtyard Complex

Intent Statement
A grouping of townhouses or individual units arranged around a central courtyard or series of courtyards at grade. The uses may include residential, retail, office, or lodging.
Location
• Node • Avenue • Commercial Village
Building Height

Min.	21 feet or 2 stories
Max.	40 feet or 3 stories

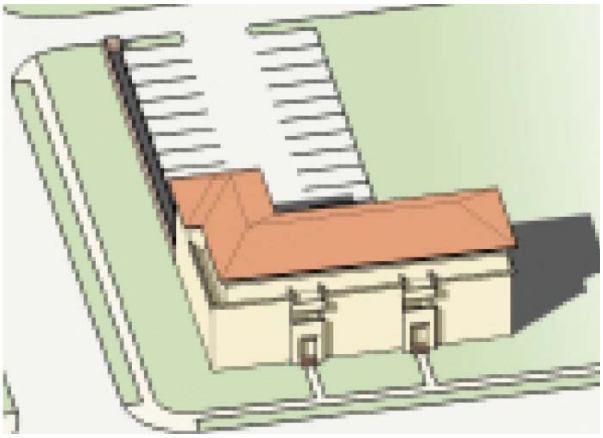
Façade Width	
Max.	Not Applicable

Maximum Upper-Level Frontage Occupancy
Not Applicable
Maximum Allowed Footprint per Story
Not Applicable
Primary Facades
• Street-facing • Inner-Courtyard
Landscaping
• Front yard landscaping shall primarily include hardscapes and potted plants.

Open Space
• Central courtyard shall average at least 20 feet in width, and at no time may be less than 10 feet in width. • Upper-floor balconies and patios may not project into minimum courtyard dimensions required to meet the 20-foot average width or 10-foot minimum width.
Primary Frontage Types
• Shopfront • Dooryard
Primary Entry Location
• Inner-Courtyard
Parking

Type	Surface	At rear of lot
	Above-Grade	Not permitted
Access	Alley	Preferred
	Secondary Street	Permitted when alleys are not present

5. Multi-Family Complex



Three-dimensional diagram

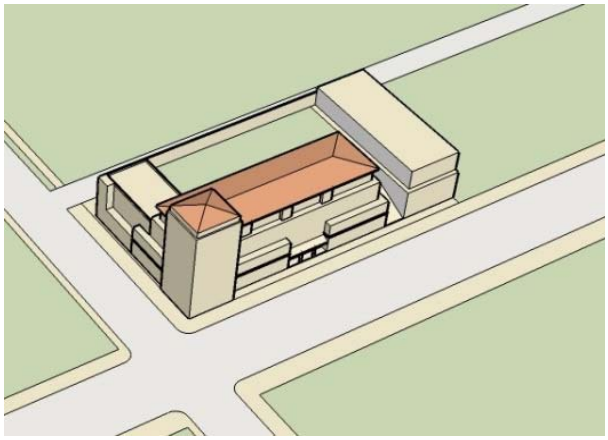


Example of Multi-Family Complex

Intent Statement		
Six units or more configured as one building, one over another, and exclusively residential.		
Location		
• Avenue		
Building Height		
Min.	2 stories	
Maximum Facade Width		
Max.	Not Applicable	
Maximum Upper-Level Frontage Occupancy		
Portions of facades above 40 feet in height and greater than 150 feet in length shall occupy no more than 80% of the primary facade plane established on the ground floor (see Figure 3).		
Maximum Allowed Footprint per Story		
Stories	1-3	4
2-3	100%	-
4	100%	85%
Primary Facades		
• Street-facing		
Landscaping		
• Front yard landscaping shall primarily include hardscapes and potted plants.		

Open Space		
• Where provided, courtyards shall average at least 25 feet in width, and at no time may be less than 10 feet in width. • Upper-floor balconies and patios may not project into minimum courtyard dimensions required to meet the 20-foot average width or the 10-foot minimum width.		
Primary Frontage Types		
• Raised terrace	• Stoop	
Primary Entry Location		
• Street		
Parking		
Type	Surface	At rear of lot
	Above-Grade	Integrated or detached
Access	Alley	Preferred
	Secondary Street	Permitted when alleys are not present

6. Podium



Three-dimensional diagram



Example of Podium Building

Intent Statement			
Podium parking is typically two levels, one underground and one at grade. At-grade-level parking is wrapped by single-loaded flats or two-story units. Roof of garage is landscaped, providing usable courtyard for residents.			
Location			
• Node • Commercial Village	• Avenue		
Building Height			
Min.	3 stories		
Maximum Facade Width			
Max.	300 feet		
>175 feet must have at least one facade break of at least 20 feet in length and 10 feet in depth			
Maximum Upper-Level Frontage Occupancy			
Portions of facades above 45 feet in height and greater than 150 feet in length shall occupy no more than 80% of the primary facade plane established on the ground floor (see Figure 3).			
Maximum Allowed Footprint per Story			
Stories	1-3	4	5
3	100%	-	-
4-5	100%	85%	50%

Primary Facades		
• Street-facing • Parking podiums at ground level and above shall be lined with habitable space along all street facing facades (alleys are excluded from this standard)		
Landscaping		
• Front yard landscaping shall primarily include hardscapes and potted plants.		
Open Space		
• Where provided, courtyards must average at least 25 feet in any dimension, and at no time may be less than 10 feet in any dimension • Upper-floor balconies and patios may not project into minimum courtyard dimensions required to meet the 25-foot minimum average dimension or the 10-foot minimum dimension		
Primary Frontage Types		
• Shopfront • Dooryard	• Stoop • Raised terrace	
Primary Entry Location		
• Street	• Podium-level Courtyard	
Parking		
Type	Surface	Not Permitted
	Above-Grade	Screened by habitable spaces on all street-facing primary facades (with the exception of alleys)
Access	Alley	Permitted

7. “Wrap” Building



Three-dimensional diagram



Example of “Wrap” Building

Intent Statement
The above-grade parking garage can be fully wrapped with building program or can be left open to a rear alley for access and ventilation. Building against garage is single-loaded corridor, while wings may be served by a double-loaded corridor.
Location
• Node • Avenue • Commercial Village
Building Height

Min.	3 stories

Maximum Facade Width	
Nodes	200 feet
Avenue	No Maximum
>175 feet must have at least one facade break of at least 20 feet in length and 10 feet in depth	

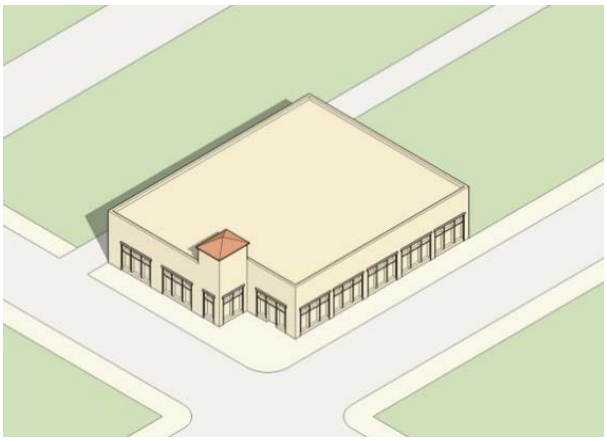
Maximum Upper-Level Frontage Occupancy
Portions of facades above 45 feet in height and greater than 150 feet in length shall occupy no more than 80% of the primary facade plane established on the ground floor (see Figure 3).

Maximum Allowed Footprint per Story			
Stories	1-3	4	5
3	100%	-	-
4-5	100%	90%	50%

Primary Facades
• Street-facing
Landscaping
• Front yard landscaping shall primarily include hardscapes and potted plants. • Trees/vegetation is allowed in all other yards, except front yard.
Open Space
• Where provided, courtyards shall be at least 25 feet in any dimension, and at no time may be less than 10 feet in any dimension • Upper-floor balconies and patios may not project into minimum courtyard dimensions required to meet the 25-foot average minimum dimension or the 10-foot minimum dimension
Primary Frontage Types
• Shopfront • Stoop • Forecourt
Primary Entry Location
• Street • Courtyard
Parking

Type	Surface	Not Applicable
	Above-Grade	Concealed from street view behind building
Access	Alley	Preferred
	Secondary Street	Permitted when alleys are not present

8. Special Type Building – Urban "Large Format"



Three-dimensional diagram



Example of Urban "Large Format" Building

Intent Statement
A multi-story building defined by its square, "L," or "U" shape that allows for large-scale retail, office, or entertainment uses of at least 40,000 sf/floor for a single tenant, such as a grocery store or department store. Parking and loading should be designed to avoid vehicular/pedestrian conflict. Unlike "Big Boxes" in suburban areas, these typically have storefronts that create a pedestrian scaled environment and may have other uses such as office and/or residential above.
Location
• Node • Avenue • Commercial Village
Building Height

Min.	2 stories

Maximum Facade Width
300 feet
Primary Facades
• Street-facing

Primary Frontage Types
• Arcade/Gallery • Shopfront • Avenue-Commercial
Landscaping
• Front yard landscaping shall primarily include hardscapes and potted plants. • Parking lot landscaping shall be included to ensure that 50% of the total parking area is fully shaded within 5 years of the construction of the building.
Open Space
• No minimum open space standard.
Primary Entry Location
• Street
Parking

Type	Surface	Not permitted
	Above-Grade	Screened by ground floor uses on all primary facades
Access	Alley	Permitted
	Secondary Street	Permitted

9. Special Type Building – Urban Theater



Three-dimensional diagram



Example of Urban Theater

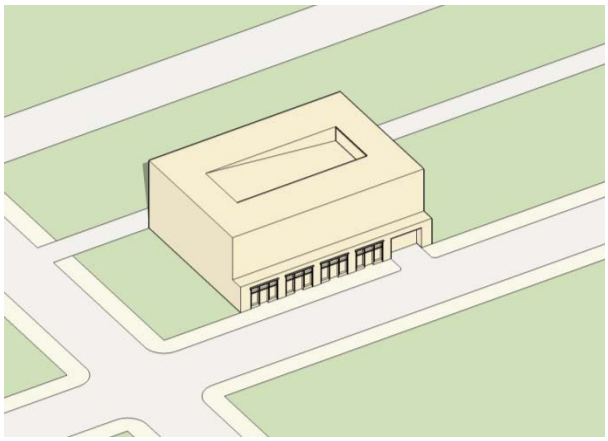
Intent Statement
A multi-story building that allows for auditorium spaces of different sizes, with a large floor-to-ceiling height, as well as common lobby areas. A distinguishing feature of the theater type is that shop windows and entrances are only utilized at the entry and occasionally in secondary lobbies above the first floor. Unlike suburban-style multiplexes, "Theaters" should be lined with storefronts accommodating other retailers so as not to present a blank wall to pedestrians. While this building type is defined by its internal volumes and primary uses, it is possible to have other uses connected to it or within it, including restaurants and cafes. Where height and FAR permit, additional retail uses may be accommodated below the theater, and/or office and residential may be accommodated above.
Location
• Node • Commercial Village • Avenue
Building Height

Min.	2 stories

Maximum Facade Width
300 feet
Primary Facades
• Street-facing
Landscaping
• Front yard landscaping shall primarily include hardscapes and potted plants.
Open Space
• No minimum open space standard.
Primary Frontage Types
• Arcade/Gallery • Shopfront
Primary Entry Location
• Street
Parking

Type	Surface	Not permitted
	Above-Grade	Concealed from street view behind bldg.; Integrated
Access	Alley	Preferred
	Secondary Street	Permitted when alleys are not present

10. Special Type Building – Public Parking Structure



Three-dimensional diagram



Example of Public Parking Structure

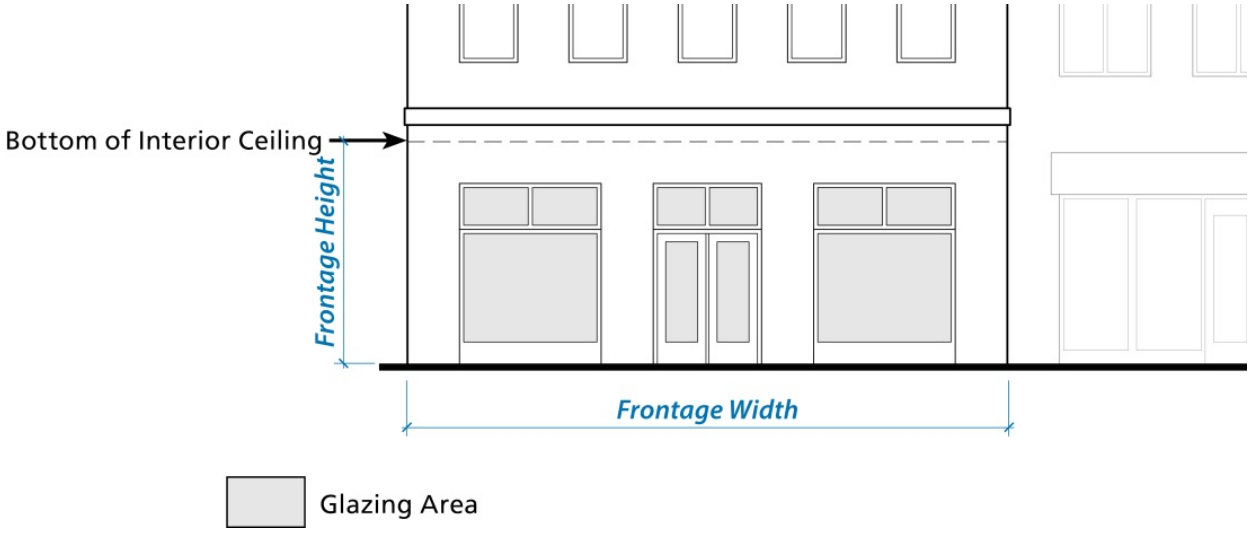
Intent Statement
An above-ground structure for vehicle public parking. This building type is designed to accommodate the need for shared public parking. Additional public uses should be considered for the top floor where views become available. Ground floor retail or office space along the edge of the building facing a public street and sidewalk are encouraged.
Location
• Node • Commercial Village • Avenue
Building Height
Min. 2 stories
Max. 45 feet or 4 stories
Maximum Facade Width
300 feet
Maximum Upper-Level Frontage Occupancy
Portions of facades above the first floor shall be set back 10 feet
Maximum Allowed Footprint per Story
Not Applicable

Primary Facades	
• Street-facing	
Primary Frontage Types	
• Arcade/Gallery	• Shopfront
Landscaping	
• Front yard landscaping shall primarily include hardscapes and potted plants.	
Open Space	
• No minimum open space standard.	
Primary Entry Location	
Retail	Street
Parking	Street, or alley when possible
Required Parking	
Not Applicable	
Surface Parking	
Not Applicable	
Above-Grade Parking Garage	
Not Applicable	
Parking Access	
• Entrances and exits may be no more than 3 lanes wide or 30 feet wide at sidewalk; • Ticket and payment machines should be recessed to allow significant stacking room inside structure.	

E. Frontage Type Standards

The frontage type standards and guidelines address the building-to-street relationship. Calculating the minimum frontage glazing is illustrated in Figure 4.

Figure 4. Minimum Frontage Glazing Diagram



1. Arcade/Gallery







Intent Statement	
A frontage wherein the facade is a **colonnade** that overlaps the sidewalk, while the facade at sidewalk level remains at the property line. This type is conventional for retail use. **Arcades** should be in alignment from building to building within a block.	
Location	
• Node • Commercial Village	• Avenue
Entries	
• Sidewalk • Alcove adjacent to sidewalk	
Dimensions	
Height to Underside of Arcade (H)	19 feet min. clear
Arcade Depth (D)	15 feet min.
Distance between Curb and face of Arcade (C)	2-4 feet
Paving and Landscaping	
Area between the property line and building face shall be paved.	
Furnishing Zone	
• Outdoor seating • Product displays	
Additional Standards	
• Locate columns so they do not align with the entry doors of ground floor tenants. • Where an arcade does not wrap around a building's corner, open its end to facilitate the pedestrian path. • Arcades should not be used unless they encompass the primary pedestrian path of travel along the sidewalk. • Shading devices that obstruct views into the arcade from the street may not be used. • At least 60% of the arcade facade area at the ground floor shall be glazed, with at least 70% of the glazing to allow views into the store rather than being shallow window box displays (see Figure 4); Glazing shall be transparent and clear; Opaque, highly reflective, and dark tinting are not permitted.	

2. Shopfront







Intent Statement	
Shopfront frontages provide direct access to ground-floor spaces that are located adjacent to the sidewalk. Shopfronts are typically associated with retail uses but may accommodate other uses.	
Location	
• Node • Commercial Village	• Avenue
Entries	
• Sidewalk • Alcove adjacent to sidewalk	
Dimensions	
Shopfront Floor-to-Ceiling Height	15-21 feet
Paving & Landscaping	
Area between the property line and the building face shall be paved	
Furnishing Zone	
• Outdoor seating • Product displays	
Additional Standards	
• At least 60% of the shopfront facade area at the ground floor shall be glazed, with at least 70% of the glazing to allow views into the store rather than being shallow window box displays (see Figure 4); Glazing shall be transparent and clear; Opaque, highly reflective, and dark tinting are not permitted. • Storefront window sill height may be no more than 30 inches high measured from the adjacent finished sidewalk • Unoccupied storefronts may be temporarily covered from the inside with white or light color paper, fabric or film, which may contain a graphic image or otherwise permitted sign • Maximum length of blank walls facing the street is limited to 15 horizontal feet for any one stretch	

3. Live/Work

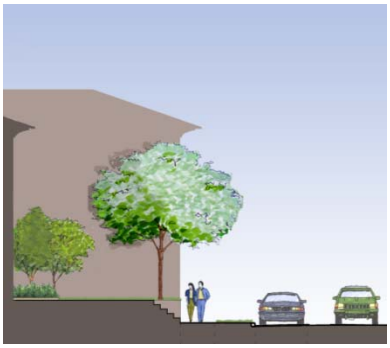




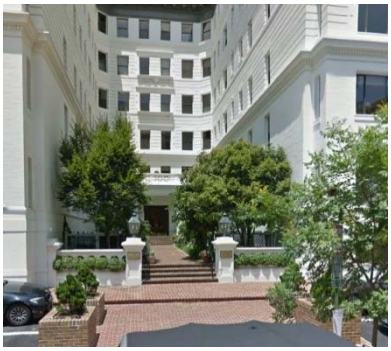


Intent Statement	
Live/Work frontages provide direct access to ground-floor spaces that are located adjacent to the sidewalk. Live/Work frontages may be associated with retail, offices or other work spaces.	
Location	
• Node • Commercial Village • Avenue	
Entries	
• Sidewalk • Alcove adjacent to sidewalk	
Dimensions	
Live/Work – Floor-to-Ceiling Height	10 feet min.
Paving & Landscaping	
Area between the property line and the building face shall be paved	
Furnishing Zone	
• Outdoor seating • Product displays	
Additional Standards	
• At least 35% of the Live/Work facade area at the ground floor shall be glazed (see Figure 4). Opaque, highly reflective, and dark tinting are not permitted. Glazed garage doors may satisfy this standard. • Live/Work window sill height may be no more than 30 inches high measured from the adjacent finished sidewalk. • Unoccupied Live/Work may be temporarily covered from the inside with white or light color paper, fabric, or film, which may contain a graphic image or otherwise permitted sign. • Maximum length of blank walls facing the street is limited to 15 horizontal feet for any one stretch.	

4. Forecourt



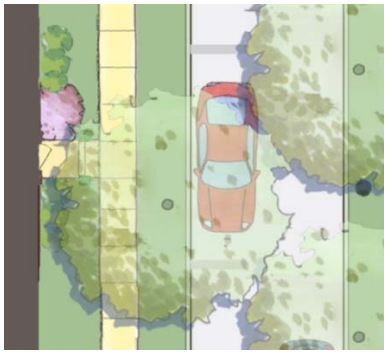




Intent Statement	
Forecourts are open areas located at primary building entrances. They may be designed as gardens or as paved courtyards. Frontages using a forecourt must comply with minimum frontage occupancy standards.	
Location	
• Node • Commercial Village	• Avenue
Entries	
Forecourt	Sidewalk
Building	3 feet max above adjacent forecourt
Dimensions	
Height	18 in. max above adjacent sidewalk
Depth	10-40 feet
Width	20-40 feet
Paving & Landscaping	
Forecourts may be planted with grass, shrubs, or other ground cover or be paved. All walks shall be paved.	
Furnishing Zone	
• Outdoor seating • Product displays • Planter pots • Water features	
Additional Standards	
• Forecourts shall be open to the sky; porches are not permitted • Forecourts may be gated • Forecourts are not intended for access by automobiles • Minimum facade occupancy standards are not applicable where forecourts are used	

5. Stoop



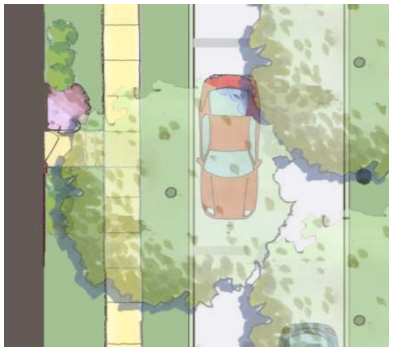


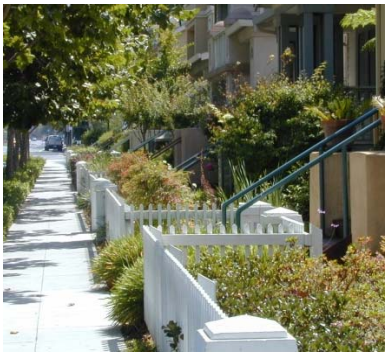


Intent Statement	
Stoops are small staircases leading to the entrance of a building. The stoop elevation provides some privacy between the sidewalk and ground-floor uses. Stoops may be covered.	
Location	
• Node • Commercial Village	• Avenue
Entries	
• Sidewalk	
Dimensions	
Height	3 feet max above adjacent sidewalk
Depth	4 feet min.
Width	4 feet min.
Paving & Landscaping	
Yards should be planted with grass, shrubs, or other ground cover. Walks shall be paved.	
Furnishing Zone	
Not Permitted	
Additional Standards	
• Awnings or canopies may cover stoops. • Elements from dooryard frontages and stoop frontages may be combined.	

6. Dooryard



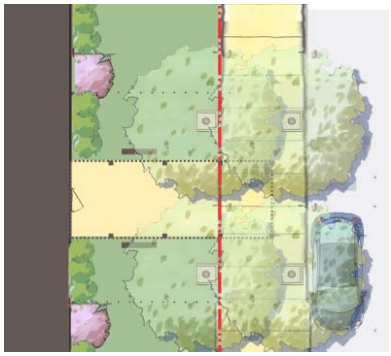




Intent Statement
Dooryard fronts are located in front setbacks and provide small landscaped and paved yards at buildings entrances. Dooryards are often enclosed by low walls, fences or hedges.
Location
• Node • Commercial Village • Avenue
Entries
Ground-floor units in multi-family buildings with corridors may have the primary entry from a corridor accessible from a common building lobby, directly from the sidewalk via a dooryard, or both.
Dimensions
Not Applicable
Paving & Landscaping
Dooryards shall be planted with grass, shrubs, or other ground cover. Walks shall be paved. Low retaining walls, fences, or hedges may not exceed 3 feet in height measured from the sidewalk.
Furnishing Zone
• Loose Furniture
Additional Standards
Elements from dooryard frontages and stoop frontages may be combined.

7. Avenue – Residential







Intent Statement
A large front yard between a building face and sidewalk that provides a buffer and privacy for the building. A canopy or awning covering the walkway to the sidewalk provides a gracious entry to the building.
Location
• Avenue
Entries
Ground-floor units in multi-family buildings with corridors may have the primary entry from a corridor accessible from a common building lobby, directly from the sidewalk via a front yard, or both.
Dimensions
10-20 feet from property line to building face
Paving & Landscaping
Front yards shall be planted with grass, shrubs, or other ground cover. Walks shall be paved. Low retaining walls, fences, or hedges may enclose a front yard. Walls and hedges may not exceed 3 feet in height measured from the adjacent sidewalk.
Furnishing Zone
• Loose furniture
Additional Standards
• None

8. Avenue – Commercial







Intent Statement	
A street frontage facing a parking lot. Here, the parking lot shall be buffered from the public right of way with landscaping or wall separating the public realm from the private retail	
Location	
• Node	• Commercial Village • Avenue
Entries	
• Avenue • Sidewalk • Alcove adjacent to sidewalk	
Dimensions	
No greater than 75 feet from property line to building face	
Paving & Landscaping	
Area between the property line and the building face shall be paved	
Furnishing Zone	
• Outdoor seating • Product displays	
Additional Standards	
• At least 60% of the shopfront facade area at the ground floor shall be glazed with at least 70% of the glazing to allow views into the store rather than being shallow window box displays (see Figure 4); Glazing shall be transparent and clear; Opaque, highly reflective, and dark tinting are not permitted. • Storefront window sill height may be no more than 30 inches high measured from the adjacent finished sidewalk. • Unoccupied storefronts may be temporarily covered from the inside with white or light color paper, fabric, or film, which may contain a graphic image or otherwise permitted sign. • Maximum length of blank walls facing the street is limited to 15 horizontal feet for any one stretch.	

1209 Architectural Standards

A. Purpose

The Architectural Standards regulate building orientation, access, projections, ceiling heights, and sustainability features.

B. Applicability

This section applies to all areas within the Incentive District.

C. General Architectural Standards

1. Building Orientation

   a. Primary Facades. All new or modified buildings shall orient the primary facade to the primary street. Secondary Facades front side and rear yards.

   b. Corner Buildings. Buildings at corners shall have primary facades fronting the Primary Street per Map 3 and confirmed by the City Planner. On some sites, corner buildings will front two Primary Streets. In these cases, both facades facing Primary Streets shall be considered primary.

2. Ground-Level Floor-to-Ceiling Heights

   When not specified by the applicable frontage type in Section 1208 (E), the minimum retail ground-floor-to-floor height shall be 15 feet. Minimum residential ground-floor-to-ceiling height shall be 10 feet.

3. Pedestrian Access

   a. Primary Pedestrian Access. Primary pedestrian access to building lobbies shall be provided along the sidewalk or permitted open spaces.

   b. Mid-Block Paseos or Open Space. Parcels longer than 300 feet shall be developed with a mid-block pedestrian paseo or open space. Where paseos are utilized, the placement shall emphasize connectivity to other paseos, alleys, or mid-block crossings.

   c. Pedestrian paseos may be no less than 15 feet wide.

   d. If pedestrian paseos are covered, they shall have a floor-to-ceiling height of at least two times their width, but no greater than three times their width.

   e. Primary Entries. Primary entries to ground floor tenant spaces or individual residential units shall be directly accessed from the sidewalk and occur at a maximum interval of 60 feet along primary streets.

   f. Retail Frontages. All frontages with retail uses shall provide tenant spaces with their own entry from the sidewalk, publically accessible open space or pedestrian paseo.

g. Multiple entrances shall be incorporated for storefronts along a street front whose length spans the width of more than 90 feet. Where multiple entrances are required by this standard, they should be no more than 60 feet from the centerline of one entrance to the center-line of the other.

h. Automobile drop-offs and porte cocheres may not be permitted along Primary Frontages where an alley is available. Exceptions may be made subject to the following findings and approval by the City Planner:

   i. The project provides a community benefit in the form of public parking or public open space.

   ii. Conflict points with pedestrians and vehicles are reduced to the extent feasible.

   iii. All parking and service access areas are provided via the alley.

   iv. Alternative surfacing materials and landscape areas clearly define the driveway entrance from the sidewalk and parking lanes.

   v. Such street frontage elements do not compromise the viability of street-adjacent landscape areas.

i. Parking is not permitted along any Primary Frontage.

4. Building Walls at the Ground Floor

   When not specified by the applicable frontage type in Section 1208 (E), along primary frontages, blank ground floor walls (defined as having no active use, glazing, or doorway) are limited to 20 percent of the linear building frontage, but in no case exceeding 40 feet of linear frontage.

5. Loading and Service

   a. Trash enclosures and retail loading areas shall be provided off of an alley where practical.

   b. Service, utility and mechanical equipment that is visible from the street should be screened from view with landscaping or enclosures.

   c. Back flow and standpipes, along with utility box transformers shall be screened.

   d. Chain link fencing with slats or mesh screen and unpainted wood are not permitted as screening materials.

   e. Mechanical equipment shall vent to an alley where practical.

6. Fenestration

   a. Ground Floor

i. Provide large windows and window display boxes along ground floor commercial spaces to activate the street and allow pedestrians to view the merchandise for sale, restaurant interiors, dance classes, art galleries, artists at work, etc. At least 60 percent of Storefront Frontage shall be glazed.

ii. Use glazing that has limited UV tinted glazing so as to provide views into the building from the street. Glazing at ground-level storefronts and offices shall have a Visible Light Reflected Out value of 12 percent or less, and a Visible Transmittance value of 0.65 or more. Developers seeking relief from this standard based on Title 24 calculations shall provide those calculations to the City Planner as evidence that all other alternative measures to comply with Title 24 requirements, such as the use of shading devices, are insufficient.

iii. The ground floor window sill height may be no higher than 30 inches above the segment of sidewalk immediately adjacent to the window.

iv. Storefront windows shall be recessed at least 6 inches from building face.

v. Interior floor displays shall not obstruct views into the store.

vi. Exterior store displays against storefronts may not exceed 36 inches above adjacent sidewalk so as to not obstruct views into the store.

b. Upper Level

i. Upper-level glazing shall have a Visible Light Reflected Out value of 15 percent or less and a Visible Transmittance value of 50 percent or more.

7. Roofs

a. Rooftop mechanical equipment, including roof vent penetrations, shall be screened from public view.

8. Projections

No projection may extend into the public right-of-way except as provided below. Projections into the public right-of-way shall be limited as follows:

a. Awnings/Canopies. Awnings and canopies may project no more than 8 feet from the building face or 33 percent of the distance between the building face and the curb, whichever is less. The minimum vertical clearance for awnings and canopies shall be 8 feet if removable or retractable and 12 feet if fixed or permanent.

Awning and canopy heights on a building shall be designed to be consistent along the facade and/or frontage line so as to maintain a consistent street edge.

b. Theater Marquees. Theater marquees may not project over the public sidewalk within 6 feet of the curb. Signage may not project more than 3 feet from the building face along block frontages where the distance from the curb to the building face is less than 18 feet in width and no more than 4 feet along block frontages where the distance between the curb and the building face is over 18 feet in width. If signage sits on the ledge of a canopy, then the guidelines for canopies shall apply (see above).

c. Balconies. Balconies may not project into required setbacks by more than 7 feet from the building façade and may not extend beyond the property line.

d. Projecting Habitable and Non-Habitable Space. The minimum vertical clearance below permitted Projecting Habitable and Non-Habitable Space shall be equivalent to the floor-to-floor ground floor height standard. The combined length of Projecting Habitable and Non-Habitable Spaces along the building face may not exceed 67 percent of the total length of the building face to which they are attached.

9. Encroachments

Encroachments shall be limited as follows:

a. Stoops. Stoops are permitted for ground floor residences only, setbacks from the property line, and the grade change for the first floor residents as doors and windows are raised from the sidewalk grade.

1. Stoops may not extend more than 8 feet from the building face and may not extend beyond the property line.
2. The finished floor of the stoop may be a maximum of 42 inches above the adjacent sidewalk grade.
3. Fences or walls defining the stoop may not exceed the height required by the building.
4. Stoops may be parallel or perpendicular to the sidewalk from which they are accessed.
5. Where they extend beyond the front setback line and run parallel to the sidewalk, the total length of the stoop or stoops may not exceed 40 percent of the total building frontage.
6. Where they are perpendicular to the sidewalk, they may be combined with non-encroaching raised planters or terraces.

b. Outdoor Seating, Dining and Temporary Display. These areas may encroach into the front setback, but may not encroach into the public right of way unless a clear area of travel is maintained of at least 6 fee t in width not encroached upon by tree grates or street furniture.

c. Raised Terraces. Raised terraces adjacent to storefronts with dining areas shall be a minimum of 7 inches in height. Raised terraces may be no taller than 42 inches as measured from the sidewalk grade. Raised terraces are permissible for restaurant and hotel uses located mid-block and behind the required minimum front yard setback line.

d. Railings. Any railings that may be required by building code or desired windscreens shall be at least 80 percent transparent.

e. Underground Parking. Underground parking may extend past the minimum front yard setback line, up to the property line.

10. Architectural Lighting

a. Building Lighting and Fixtures

i. Frontages, entrances, arcades pathways, corner plazas, and adjacent public sidewalks shall be illuminated for pedestrian safety. Lighting may be freestanding or attached to the building. Lighting provided for pedestrian safety shall be mounted between 10 and 14 feet above the ground. Lighting along alleys shall be connected to a separate circuit.

ii. Lighting sources shall be shielded so that light is aimed downward or back at the building wall.

iii. Incandescent and high-pressure sodium exterior lights are prohibited.

1210 Large Lot Standards

A. Purpose

1. The purpose of this section is to provide standards for the development and redevelopment of large parcels or assemblages.

B. Applicability

Any parcel or parcel assemblage with a contiguous area of 60,000 sf or more shall be developed according to these Large Lot Standards.

C. Submittal Standards

An application for a Development Plan review qualifying under this section shall include, at a minimum, a plan sheet with diagrams and text which identifies proposed individual building sites and their dimensions, existing adjacent streets, proposed new streets, proposed building types, proposed frontage types, and the relationship of the project site to its surroundings.

D. Relationship to Land Use Standards, Urban Standards, and Architectural Standards

1. Each building within a large lot development shall comply with the applicable standards in the Land Use Standards, Urban Standards, and Architectural Standards. However, standards shall be amended as follows:

a. Primary Frontage Line: For buildings not abutting an existing street, the plan shall introduce a new street, alley or pedestrian paseo that is open to the sky for at least 50 percent of its length and accessible to the public at least during daylight hours and a proposed Primary Frontage Line along that street or paseo. Buildings proposed to front the new street or pedestrian paseo are not subject to any setback standards from the new street or paseo.

b. Development on parcels or parcel assemblages exceeding 90,000 sf shall be subject to Section 1210 (C) (1) a, above, and be composed of at least two distinct buildings (not connected via interior circulation, except as part of a subterranean parking structure) which may be the same or different building types as allowed by the applicable subarea.

c. Frontage Types shall be permitted based upon the applicable subarea in which the project is located.

E. Access

1. In cases where parcel sizes exceed 90,000 sf, development shall provide for new streets and/or pedestrian paseos, according to the rules below and as shown in Figure 5.

   a. Vehicular and pedestrian access shall include new internal streets, alleys, or driveways. Cul-de-sacs and dead-end streets are prohibited except where public utility constraints (e.g., railroad right-of-ways) prohibit through streets. Alleys or woonerfs (i.e., roads in which devices for reducing or slowing the flow of traffic have been installed) may be dead-end if they allow for future connection to adjacent parcels. Garage doors shall face alleys, woonerfs, or driveways. Flag lots are prohibited.

   b. Parcels over 90,000 sf shall require at least one publicly accessible bisecting street, alley, or woonerf. Where such parcels border an existing public street and an existing alley sufficient to service the entire parcel, then the site may be partially bisected by a pedestrian paseo (minimum 15 feet wide between primary building walls) that is open to the sky for at least 50% of its length and accessible to the public at least during daylight hour in lieu of a street, alley, or woonerf.

   c. Lots over 125,000 sf shall require at least one publicly accessible street. If the resulting subdivision includes parcels over 125,000 sf, they too shall require one publicly accessible bisecting street. If the resulting subdivision includes parcels over 90,000 sf, they too shall require one publicly accessible bisecting street, alley, or woonerf or, where conditions apply, may be partially bisected by a pedestrian paseo (see above for allowable conditions) as per Section 1210 (D) (1) b, above.

d. New streets shall be designed to emphasize the pedestrian experience. Roadway widths shall be the minimum deemed acceptable by the City Engineer and Fire Department.

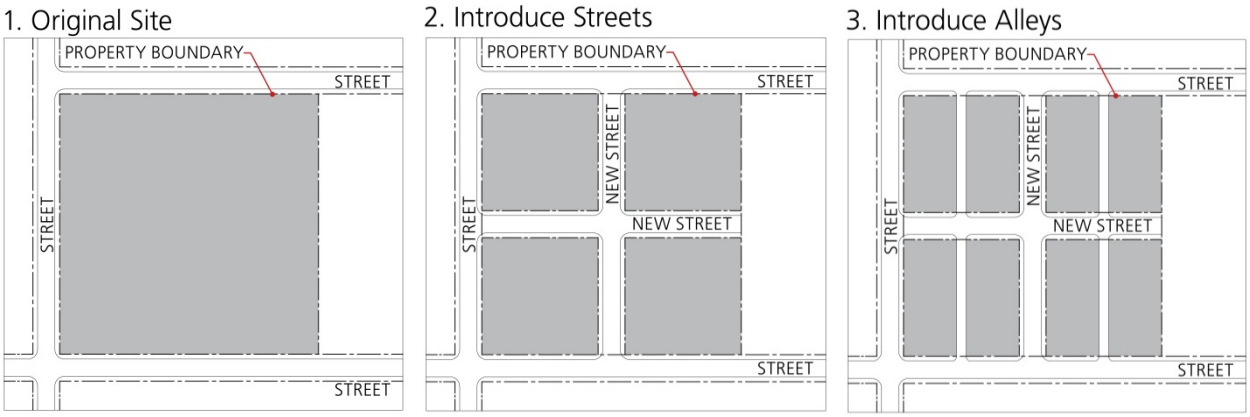


Figure 5. Large Lot Development

1211 Parking Standards

A. Applicability

All development and redevelopment established under the Incentive District shall comply with the parking standards contained in Article 31 Off-Street Parking and Loading Regulations of the 1992 Ordinance, with the exception of the provisions contained in subsections (B) and (C) below.

B. Minimum Parking Standards

Table 4. Required Parking Spaces

Use	Parking Spaces Required
Nonresidential Uses[1]	1 for each 500 sf of gross floor area
Artisan Manufacturing	1 for each 800 sf of gross floor area
Eating and Drinking Establishment[2]	1 for each 125 sf of seating area
Visitor Accommodations	1 per unit
Personal Services	1 for each 600 sf of gross floor area
Residential[4]	1 parking space per 1,500 sf of habitable space[3]

Notes:

1) The nonresidential use category shall apply to all nonresidential uses within the Incentive District except those explicitly listed in Table 4 or in this footnote.

2) Eating and Drinking Establishments shall include; Restaurant, Full Service; Restaurant, Fast Food; Bars and Cocktail lounges; Food and Beverage Sales; Breweries, Craft; Wineries, Craft as defined in Section 1212.1.

3) The minimum parking standard is calculated from a total aggregate square footage of habitable space for the residential project.

4) No parking spaces shall be required for housing units dedicated to affordable housing units, senior housing units, or SROs.

C. Additional Parking Provisions

1. No parking spaces shall be required to be individually accessible. However, parking spaces may not be more than two-deep (tandem), unless they are served by mechanical systems or robotic parking that allows for independent access.

2. Shared on-site parking among land uses with different periods of peak parking demand shall be allowed for all uses in the plan area. Shared on-site parking shall be allowed to satisfy 100 percent of the parking standard for each use, so long as documentation can be provided that the existing and anticipated land uses will have different periods of peak parking demand and the shared parking can accommodate the parking demand for both uses.

3. Off-site parking within 1,250 feet shall be allowed for all uses in the plan area. Off-site parking further than 1,250 feet should be allowed at the discretion of the City Planner as long as documentation that a shuttle bus service or valet parking service will be provided.

4. Upon establishment of an in-lieu parking fee, payment of the in-lieu fee may be used to 100 percent satisfy the required interim parking standard for each parking space that is not provided.

1212 Definitions

1212.1 Land Use Classifications

The use classifications defined in this section are listed in Section 1207 (C) of this article. Definitions identified as "New" are unique to the Coast Highway Incentive District. Definitions identified as "Existing" are defined by Article 4 Use Classifications of the 1992 Ordinance. Definitions identified as "Existing/Modified" include slight modifications from the Article 4 Use Classifications of the 1992 Ordinance.

A. Animal Sales and Service (Existing)

1. Animal Boarding. Provision of shelter and care for animals on a commercial basis. This classification includes activities such as feeding, exercising, grooming, and incidental medical acre. (Existing)

2. Animal Grooming. Provision of bathing and trimming services for animals on a commercial basis. This classification includes boarding of domestic animals for a maximum period of 48 hours. (Existing)

3. Animal Hospitals. Establishments where animals receive medical and surgical treatment. This classification includes only facilities that are entirely enclosed,

soundproofed, and air-conditioned. Grooming and temporary (30 days) boarding of animals is included if incidental to the hospital use. (Existing)

4. Animals: Retail Sales. Retail sales and boarding of animals provided such activities take place within an entirely enclosed building. This classification includes grooming if incidental to the retail use, and boarding of animals not offered for sale for a maximum period of 48 hours. (Existing)

B. Artisan Manufacturing. A facility accommodating manufacturing processes involving and/or producing: apparel; food and beverage products; electronic, optical and instrumentation products; jewelry; and musical instruments. Artisan manufacturing also includes other establishments engaged in the assembly, fabrication, and conversion of already processed raw materials into products, as well as the incidental storage, sales and distribution of such products, where the operational characteristics of the manufacturing processes and the materials used are unlikely to cause impacts on surrounding land uses or the community. Typical artisan manufacturing uses include, but are not limited to; food and beverage product manufacturing such as breweries, wholesale bakeries, and coffee roasting; printing and publishing; art and jewelry making, clothing and fabric production; metal work; furniture making; glass or ceramic production; photo/film processing; and paper product manufacturing. (New)

C. Assembly/Meeting Facility. Meeting, recreational, or social facilities of a private or nonprofit organization primarily for use by members or guests. Includes clubs, lodges, private meeting halls, religious assembly facilities (e.g., churches, mosques, synagogues, etc.), private auditoriums, union halls, etc. This use classification excludes private schools as defined in this section. (Existing/Modified – Clubs and Lodges and Religious Assembly)

D. Bars and Cocktail Lounges. Any premises designed, used or intended to be used for the selling or serving of alcoholic beverages to the public for consumption on the premises, and in which food is not sold or served to the public as in a bona fide restaurant. (Existing)

E. Child Care. Non-medical care and supervision on a less than 24-hour basis in any care facility of any capacity, and not within a licensee's home for persons under the age of 18. (Existing)

F. Commercial Recreation and Entertainment – Indoor. Provision of participant or spectator recreation or entertainment. This classification includes bowling alleys, billiard parlors, pool rooms, dance halls, ice/roller skating rinks, scale-model courses, shooting galleries, arcades and game centers having five or more coin-operated game machines and card rooms. This does not include outdoor facilities such as amusement parks, batting cages, go-cart tracks, golf-driving ranges, and miniature golf courses. (Existing/Modified).

1. Dance Establishment. Any premises wherein a public dance, as defined in the Oceanside City Code, is held. (Existing)
2. Pool Rooms, Billiard Rooms, and Shooting Galleries. Pool rooms, billiard rooms, and shooting galleries as defined in the Oceanside City Code. (Existing)
3. Arcades and Game Centers. Any place having five or more coin-operated, slug-operated, or any type of amusement or entertainment machines for which payment is necessary for operation. These include, but are not limited to, pinball machines and video games, but do not include merchandise vending machines or mini-jukeboxes (see Article 36 Separation of Regulated Uses of the 1992 Ordinance). (Existing)

G. Brewery, Craft. A small-scale beer manufacturing facility that includes designated floor area (comprising no less than 20 percent and no more than 40 percent of the total floor area) for product sampling and/or retail sales of beer conforming to state requirements. Retail sales of craft brewery merchandise including mugs, pint glasses, growlers, tap handles, coasters, apparel, signs, bottle openers, and books are also permitted. A craft brewery shall produce a minimum of 250 barrels annually and not exceed a maximum output of 15,000 barrels annually (with a barrel of beer being equal to 31 U.S. gallons). Facilities housing a craft brewery shall not exceed 15,000 square feet of floor area. The category of a craft brewery (based upon floor area and scale of operation) shall determine the appropriate review and approval process, as specified below. Such facilities shall be subject to the following limitations:

1. Other than business name and/or logo, such uses shall not display exterior signage (including advertising directed to the exterior from interior spaces) that promotes the availability of alcoholic beverages.
2. There shall be no amusement or video machines maintained on the premises.
3. There shall be no "happy hour" or regular periods of reduced-priced alcoholic beverages.
4. Amplified live entertainment shall require issuance of an Administrative Use Permit.
5. Ancillary food service involving outdoor equipment (e.g., food trucks) shall require issuance of an Outdoor Facilities Permit.
6. Delivery/distribution activities involving Class 4 or higher vehicles shall not occur between the hours of 10 p.m. and 7 a.m.
7. Hours of operations shall not extend beyond 10 p.m., unless extended hours of operation are approved through a Conditional Use Permit.

Craft breweries shall be regulated under the following tiered review and approval process:

1. Tier 1: Produces at least 250 and no more than 10,000 barrels annually and does not exceed 10,000 square feet of floor area. Tier 1 facilities are subject to approval of an Administrative Conditional Use Permit (ACUP) when not abutting residential zoning districts, schools, and/or churches. Tier 1 facilities abutting residential zoning districts, schools, and/or churches are subject to approval of a Conditional Use Permit (CUP).
2. Tier 2: Produces at least 750 and no more than 15,000 barrels annually and does not exceed 15,000 square feet of floor area. Tier 2 facilities are subject to approval of a Conditional Use Permit (CUP).

H. Cultural Institutions. Nonprofit institutions displaying or preserving objects of interest in one or more of the arts or sciences. This classification includes libraries, museums, and art galleries. (Existing)

I. Financial Services. Financial institutions that provide retail banking services to individuals and businesses. This classification is limited to institutions engaged in the on-site circulation of cash money including businesses offering check-cashing facilities. (Existing/Modified)

1. Drive-Through/Drive-Up Service. Institutions providing self-service banking facilities that are not associated with a primary banking or savings and loan building located on the same site. (Existing)
2. Self-Service Facilities (ATMs). Institutions providing self-service banking facilities that are not associated with a primary banking or savings and loan building located on the same site. (Existing)

J. Food and Beverage Sales. Retail sales of food and beverages for off-site preparation and consumption. Typical uses include groceries, liquor stores, or delicatessens. Establishments at which 20 percent or more of the transactions are sales of prepared food for on-site or take consumption shall be classified as Catering Services. (Existing/Modified)

K. Hospitals. Facilities providing medical, surgical, psychiatric, or emergency medical services to sick or injured persons, primarily on an inpatient basis. This classification includes incidental facilities for outpatient treatment, as well as training, research, and administrative services for patients and employees. (Existing)

L. Offices, Business and Professional. Offices of firms or organizations providing professional, executive, management, or administrative services, such as architectural, engineering, real estate, insurance, investment, legal, and medical/dental offices. This classification includes medical/dental laboratories incidental to an office use, but excludes banks and savings and loan associations. (Existing)

M. Parking as a Primary Use Land Use. Any lot or space where vehicles may be kept, sometimes for a fee, and includes public parking areas. (New)

N. Park and Recreation Facilities. Noncommercial parks, playgrounds, recreation facilities and open spaces. Includes squares, plazas, outdoor theaters, skateparks, dog parks, trails, beaches, playgrounds, sports fields, greenbelts and other park, recreation and open space areas, including buildings and facilities that comprise the parks and recreation system of the city under the management and control of the Neighborhood Services Department. (Existing/Modified)

O. Personal Improvement Services. Provision of instructional services or facilities, including; photography, fine arts, crafts, dance or music studios, driving, business or trade schools, diet centers or reducing salons, health and fitness studios, spas or clubs. (Existing)

P. Health/Fitness Studios, Spas or Clubs. A fitness center, gymnasium, health and athletic club or studio, which may include any of the following: sauna, spa or hot tub facilities; indoor tennis, handball, racquetball, archery and shooting ranges, rock climbing and other indoor sports activities. Outdoor areas may be used as accessory to the primary use held indoors. (New)

    1. Massage Establishments. Establishments providing massage service. (Existing)

Q. Personal Services. Any premises primarily engaged in the provision of non-medical services for the enhancement of personal appearance, cleaning, alteration or reconditioning of garments and accessories, and similar non-business-related or nonprofessional services. These uses may also include accessory retail sales of products related to the services provided. Personal services include barber shops or beauty parlors, dry cleaning, self-service laundromats, locksmiths, tailors and shoe repair shops, tattoo parlors, and similar establishments catering directly to consumers. (Existing/Modified)

    1. Tattooing Establishment. Any establishment or business engaged in "tattooing" as defined in the Oceanside City Code, excluding "micropigmentation" or "permanent cosmetic makeup" typically provided at beauty salon or day spas.

    2. Body Piercing Establishment. Any establishment or business engaged in "body piercing." Body piercing means the creation of an opening in the body of a human being for the purpose of inserting jewelry or other decoration. This includes, but is not limited to, piercing of an ear, lip, tongue, nose, eyebrow, naval, genitals, breasts. "Body piercing" does not include piercing an ear with a disposable, single-use stud or solid needle that is applied using a mechanical device to force the needle or stud through the ear.

R. Residential. Any building or portion thereof which is used for residential purposes, including multi-family dwelling units, live/work units, group houses, rest homes, residential care facilities, and rest homes, and accessory buildings and structures. (New)

1. Group Residential. Shared living quarters without separate kitchen or bathroom facilities for each room or unit. This classification includes roomhouse/boardinghouse, dormitories, fraternities, sororities, and private residential clubs, but excludes residential hotels (see Single-Room Occupancy (SRO) Residential Hotels). (Existing)
2. Live/work. A mixed-use unit consisting of an office land use or retail land use with a residential land use. The habitable area may be anywhere in the unit and is intended to be occupied by a business operator who lives in the same structure that contains the office or retail activity. (New)
3. Multifamily Residential. Two or more dwelling units on a site. This includes two-family dwelling units, three-family dwelling units, four-family dwelling units, zero lot line development, townhomes, and apartments. (New)
4. Convalescent Facilities. Establishments providing care on a 24-hour basis for persons requiring regular medical attention, but excluding facilities providing surgical or emergency medical services. (Existing)

S. Restaurants, Fast Food. A bona fide restaurant establishment where the principal business is the sale of prepared or rapidly prepared food and beverages to guests via counter, walk up, or window service for consumption on or off the premises. The sale of beer and wine for on-site consumption is permitted. As used in this definition, a "bona fide" restaurant shall have suitable kitchen facilities for cooking and/or preparation of meals. The word "meals" means the assortment of food commonly ordered at various hours of the day. (Existing)

1. Restaurants, Fast Food with Drive-thru or Drive-up. A restaurant establishment providing service from a building to patrons in vehicles through an outdoor service window (Drive-thru) or delivery service to vehicles parked in designated parking spaces (Drive-up). The sale and consumption of alcoholic beverages at a restaurant with a Drive-thru or Drive-up window is prohibited.

T. Restaurant Full Service. A bona fide restaurant establishment where the principal business is the sale of food and beverages to guests via table service for consumption on the premises. The sale of beer and wine for on-site consumption shall be considered incidental to the full service restaurant. Delivery service to vehicles parked in designated parking spaces (i.e. drive-up) is allowed as an ancillary service to the Restaurant Full Service. As used in this definition, a "bona fide" full service restaurant shall have suitable kitchen facilities for cooking of complete meals. The word "meals" means the assortment of foods commonly ordered at various hours of the day; the service of only such foods as sandwiches or salads does not meet the bona fide restaurant definition.

1. Restaurants Full Alcohol. A bona fide restaurant establishment authorized to sell distilled spirits for consumption on licensed premises. The sale of liquor is

included as an appurtenant use to full service restaurants having table seating and service for more than 50 guests.

2. Restaurants Full Service with Live Entertainment – (Small Scale). Restaurant establishments providing live entertainment to patrons with 5 or fewer performers at restaurant facilities with no dance floor during typical lunch and dinner hours (11:00 a.m. – 11:00 p.m.) and having 75 percent food sales compared to alcohol sales.

U. Retail. Premises available for the sale of many lines of merchandise and food service. These include, but are not limited to: art galleries, art supplies, bakeries, book or stationary shops, cameras and photographic supplies, collectibles, dress or millinery shops, drug stores, dry goods, florist shops, gifts, sundries and souvenir shops, grocery stores, hardware stores, jewelry stores, meat markets or delicatessen stores, recreation equipment rental and sales, shoe stores convenience food store, liquor store, and secondhand store. (New)

1. Convenience Market. Retail sales of food, beverage and small convenience items typically found in establishments with long or late hours of operation. This definition excludes delicatessens and other specialty food shops having a sizeable assortment of fresh fruits and vegetables, and fresh-cut meat or fish. (Existing)

2. Drive-in facilities. Any place of business, excluding gasoline service stations, which transact any part or all of its business directly with customers within a vehicle. (New)

3. Liquor store. A place or business engaged in the primary business of off-sale alcoholic beverages. For the purposes of article, primary business shall mean 25 percent or more of the shelf area of a business. (Existing)

4. Pawnshops. Establishments engaged in the buying or selling of new or secondhand merchandise and offering loans secured by personal property and subject to Chapter 22 of the Municipal Code. (Existing)

5. Recreational equipment rental and sales. Shall mean any recreational facilities operated as a business and open to the general public for a fee. This includes bicycles, commercial fishing, diving, and sportfishing establishments including supplies and services. (Existing/Modified)

6. Secondhand Furniture, Appliances, "Collectibles," and Clothing Sales. The retail sale of used furniture, appliances, "collectibles," and clothing, and secondhand dealers who are subject to Chapter 22 of the Municipal Code. This classification excludes antique shops primarily engaged in the sale of antique furniture and accessories. (Existing)

V. Schools. A public or private academic institution including school providing specialized education/training. Example include: Elementary, middle and high school, art schools, computer and electronic school, professional school (law, medicine, etc.) Also includes facilities, institutions and conference centers that offer specialized programs for personal growth and development. Does not include child care facilities (see Child Care) or Studios used for smaller-scale facilities offering specialized instruction. (New)

W. Studios. Small-scale facilities, typically accommodating one group of students at a time, in no more than one instructional space. Larger facilities are included under the definition of Schools. Examples of these facilities include: individual and group instruction and training in the arts; production rehearsal; photography, and the processing of photographs produced only by users of the studio facilities; martial arts training studios; gymnastics instruction, and aerobics and gymnastics studios with no other fitness facilities or equipment. Also includes production studios for individual musicians, painters, sculptors, photographers, and other artists. (New)

X. Theaters. An indoor facility for group entertainment. Examples include movie theaters and facilities for live theater and concerts. (New)

Y. Vehicle/Equipment Sales and Services. This does not include commercial parking facilities (see Parking as a primary use). (Existing/Modified)

1. Automobile Washing. Washing, waxing, or cleaning of automobiles or similar light vehicles. (Existing)

2. Service Stations. Establishments engaged in the retail sale of gas, diesel fuel, lubricants, parts, and accessories. This classification includes incidental maintenance and repair of automobiles and light trucks, but excludes body and fender work or repair of heavy trucks or vehicles. (Existing)

3. Vehicle/Equipment Repair. Repair of automobiles, trucks, motorcycles, mobile homes, recreational vehicles, or boats, including the sale, installation, and servicing of related equipment and parts. This classification includes auto repair shops, body and fender shops, wheel and brake shops, and tire sales and installation, but excludes vehicle dismantling or salvage and tire retreading or recapping. (Existing)

4. Vehicle/Equipment Sales and Rentals. Sale or rental of automobiles, motorcycles, trucks, tractors, construction or agricultural equipment, mobile homes, and similar equipment, including storage and incidental maintenance. (Existing)

5. Vehicle Storage. Storage of operative or inoperative vehicles. This classification includes storage of parking tow-aways, impound yards, and storage lots for automobiles, trucks, buses, and recreational vehicles, but does not include vehicle dismantling. (Existing)

Z. Visitor Accommodations. A facility that offers transient lodging accommodations to the general public, and includes campgrounds and recreational vehicle parks, hotels, motels, tourist cottages, and accessory uses. (Existing/Modified)

1. Bed and Breakfast Inns. Establishments offering lodging on a less than weekly basis in a converted single-family or multi-family dwelling, with incidental eating and drinking service for lodgers only provided from a single kitchen. (Existing)
2. Hotels, Motels and Time-Share Facilities. Establishments offering commercial lodging on a less than monthly basis. This classification includes incidental eating, drinking, and banquet services intended for the convenience of guests. (Existing)
3. Single-Room Occupancy (SRO) Residential Hotels. Buildings with six or more guest rooms without kitchen facilities in individual rooms, or kitchen facilities for the exclusive use of guests, and which are also the primary residences of the hotel guests. (Existing)
4. Vacation Club. Prepaid or credit based establishments offering lodging on a less than weekly basis and having kitchens. This classification includes eating, drinking and banquet services. (Existing)

AA. Winery, Craft. A small-scale winemaking facility that includes designated floor area (comprising no less than 20 percent and no more than 40 percent of the total floor area) for product sampling and/or retail sales of wine conforming to state requirements. Retail sales of craft winery merchandise including wine glasses, wine bottles, decanters, corkscrews, home décor, apparel, signs, books, and other wine paraphernalia are also permitted. A craft winery shall produce a minimum of 300 cases annually and not exceed a maximum output of 10,000 standard cases annually (with a standard case of wine containing twelve 750 ml bottles or nine liters of wine). Facilities housing a craft winery shall not exceed 15,000 square feet of floor area. The category of a craft winery (based upon floor area and scale of operation) shall determine the appropriate review and approval process, as specified below. Such facilities shall be subject to the following limitations:

1. Other than business name and/or logo, such uses shall not display exterior signage (including advertising directed to the exterior from interior spaces) that promotes the availability of alcoholic beverages.
2. There shall be no amusement or video machines maintained on the premises.
3. There shall be no "happy hour" or regular periods of reduced-priced alcoholic beverages.
4. Amplified live entertainment shall require issuance of an Administrative Use Permit (ACUP).

5. Ancillary food service involving outdoor equipment (e.g., food trucks) shall require issuance of an Outdoor Facilities Permit.
6. Delivery/distribution activities involving Class 4 or higher vehicles shall not occur between the hours of 10 p.m. and 7 a.m.
7. Hours of operations shall not extend beyond 10 p.m., unless extended hours of operation are approved through a Conditional Use Permit.

Craft wineries shall be regulated under the following tiered review and approval process:

1. Tier 1: Produces at least 300 and no more than 7,000 standard cases annually and does not exceed 10,000 square feet of floor area. Tier 1 facilities are subject to approval of an Administrative Conditional Use Permit (ACUP) when not abutting residential zoning districts, schools, and/or churches. Tier 1 facilities abutting residential zoning districts, schools, and/or churches are subject to a Conditional Use Permit (CUP).
2. Tier 2: Produces at least 900 and no more than 10,000 standard cases annually and does not exceed 15,000 square feet of floor area. Tier 2 facilities shall be subject to approval of a Conditional Use Permit (CUP).

1212.2 Architectural and Development Standards

A. Arcade. A frontage type typical for retail uses wherein the facade is a colonnade supporting habitable space that overlaps the sidewalk, while the facade at sidewalk level remains at the primary frontage line.

B. Bay System. The spaces between posts, columns, or buttresses in the length of a building.

C. Blockfronts. The aggregate of private lots, passages, alleys, circumscribed by streets.

D. Colonnade. A row of columns supporting a roof or arcade.

E. Encroachments. An encroachment is defined as either a fixed or moveable architectural or furnishing element that projects beyond the building face at the ground level or below ground.

F. Façade Compositional Strategy. The combining of distinct parts or elements of building facades to form a unified whole.

G. Habitable Projecting Space. Habitable Projecting Space is a portion of a building enclosed by walls and a roof that extends beyond the building face (i.e., bay windows and other architectural projections).

H. Massing. The perception of the general shape or form as well as the size of a building.

I. Mixed-Use Development. Development that includes two or more land uses.

J. Non-Habitable Projecting Space. Non-habitable Projecting Space is a space used by occupants that are not enclosed by walls and a roof, such as balconies. They should not extend more than 6 feet from the building face and should not extend beyond the property line.

K. Porte Cochere. A vehicular passageway leading through a building or screen wall into an interior courtyard. A porte cochere can also refer to a roofed structure extending from the entrance of a building over the adjacent driveway and sheltering those getting in or out of vehicles.

L. Pedestrian Paseo. A pathway, open or roofed, that serves as an extension of the sidewalk as it passes from the primary frontage line onto private property, often between buildings, to courtyards, parking areas, or civic spaces.

M. Primary Frontage Line. A setback, parallel to the primary street, which marks the location from which the principle vertical plane of the building façade must be erected.

N. Primary Street. Streets with key circulation, mix of intensities, more pedestrian and vehicular accommodation than secondary streets, most developed street, with a mix of uses and access to transit.

O. Secondary Street. Street with single use development as opposed to mixed-use development that are fed from primary streets, have less circulation than primary street, have less mix of intensities than primary streets, and have less of pedestrian and vehicular traffic than the main streets.

P. Standalone Residential. A residential development where residential is the primary use and other land uses such as retail or office are not included as a primary or secondary use. A standalone residential development may include open space and other uses considered incidental in a residential development project.

Q. Stoops. Stoops are elevated entry porches with stairs paced close to the front setback line.

R. Transoms. A transverse horizontal structural beam or bar, or a crosspiece separating a door from a window above it.

S. Underlying Zoning. The underlying zoning district per the 1986 zoning ordinance.

T. Visible Light Reflected Out. A value describing the percentage of total visible light that is reflected by a window glass and film system.

U. Visible Transmittance. A value describing the percentage of visible light that can pass through a window glass and film system.

V. Woonerfs. A road in which devices for reducing or slowing the flow of traffic have been installed.

1212.3 Frontage and Building Type Terms

A. Allowable Building Types. Defines which building types are permitted within each subarea. Allowable building types are provided in 1208 (C) and (D) and the following describes the standards provided for each building type.

1. Building Intent Statement. This statement describes the intent of each building type.
2. Locations. List of subareas where specified building types are permissible.
3. Maximum Building Height. The maximum building height for the building type.
4. Maximum Façade Width. The maximum dimension along a frontage of any single façade.
5. Maximum Upper-Level Frontage Occupancy. The maximum linear dimension of building face above a specified height that may be set along the building frontage.
6. Maximum Allowed Footprint Per Story. The maximum percentage of the site's buildable area (after excluding required setbacks) that may be constructed per story.
7. Primary Facades. The primary orientation of the building facades.
8. Landscaping. Landscaping standards by building type.
9. Open Space. Any open space standards applicable to the building type.
10. Primary Frontage Types. The primary frontage types that may be used for each building type.
11. Primary Entry Locations. The location of the building's front door.
12. Parking. Parking orientation standards by building type.

B. Allowable Frontage Types. Defines which frontage types are permitted within each subarea. In some cases, the permitted frontage types may also be regulated according to the street on which they face and must also comply with the permitted frontage types of the selected building type. Allowable frontage types are provided in Section 1208 (E) and the following describes the standards provided for each frontage type.

1. Frontage Intent Statement. This statement describes the building-to-street relationship that each frontage type is meant to achieve.
2. Locations. List of subareas where specified frontage types are permissible.
3. Entries. These standards address entries at the blockfronts, not those that are internal to the site.

4. Dimensions. Specific dimensions of features like massing, entry height, openings, and setbacks are delineated here.
5. Paving and Landscaping. This standard addresses the area between the property line and building face.
6. Furnishing Zone. This standard addresses furnishing within front setbacks.
7. Additional Standards and Guidelines. These standards and guidelines provide additional direction in shaping the appropriate building-to-street relationship. They address glazing at the ground floor, frontages, and entries (see Figure 4).

C. Maximum Building Height. Identifies the maximum height buildings in each subarea are not allowed to exceed.

D. Maximum Average Building Height. Requires buildings to create a varied "street wall" by requiring portions of a development to have different heights to meet the average standard. In no case can any portion of the development exceed the Maximum Building Height standard. Figure 1 identifies how average building height shall be calculated to determine compliance with the standard.

E. Minimum Frontage Occupancy. Is the minimum percentage of a blockfront at which a building frontage is set either at or within the zone established by the minimum and maximum Setback Lines, as shown in the Setback Regulating Plan, Map 3. The Minimum Frontage Occupancy is measured as a linear distance parallel to the property line. The remaining frontage length may be set behind the Maximum Setback Line or may be left unoccupied.

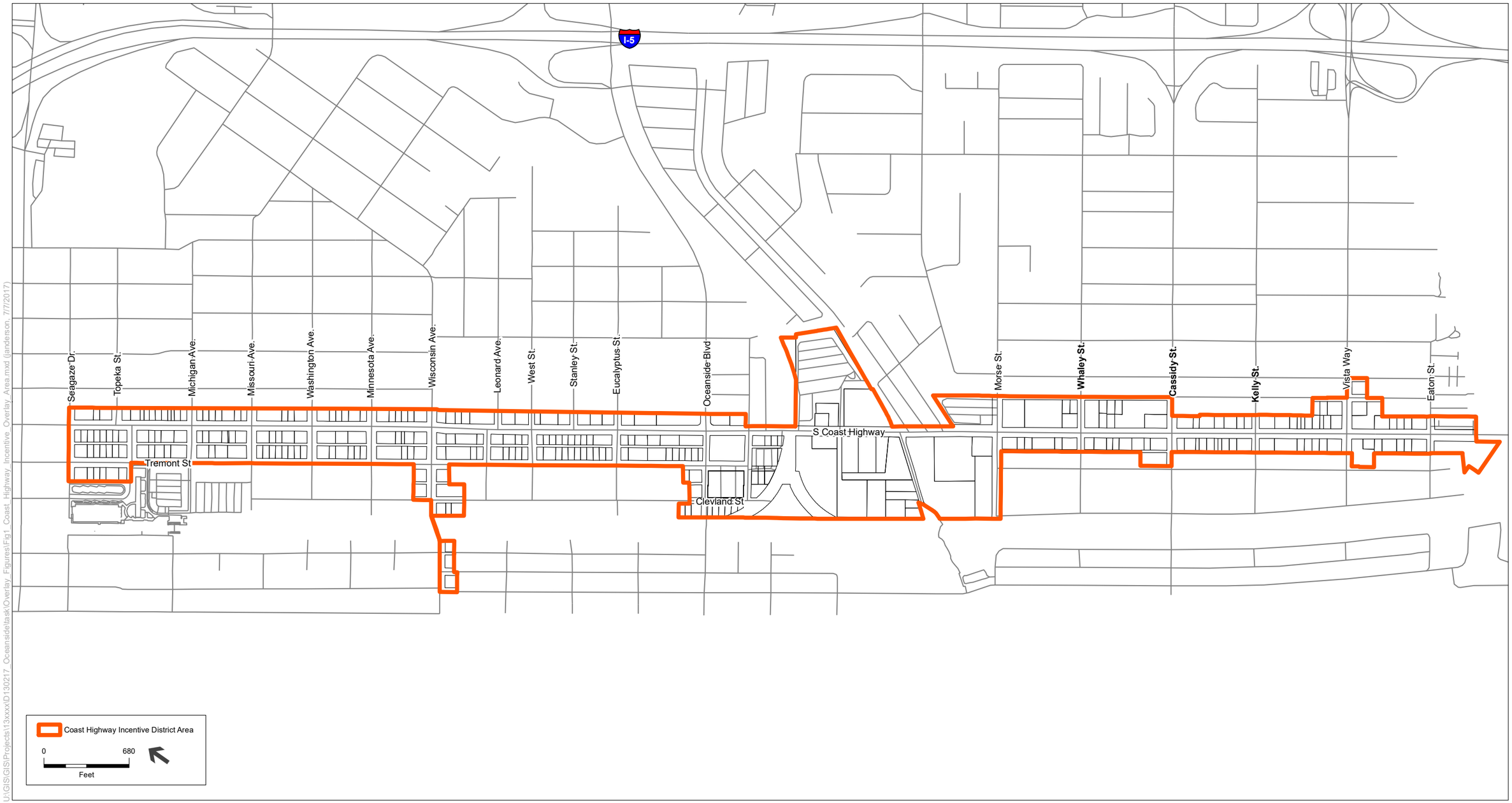
MAPS

MAP ONE: Coast Highway Incentive District

MAP TWO: Subarea Plan

MAP THREE: Setback Regulating Plan

MAP FOUR: Residential Incentive Program Area



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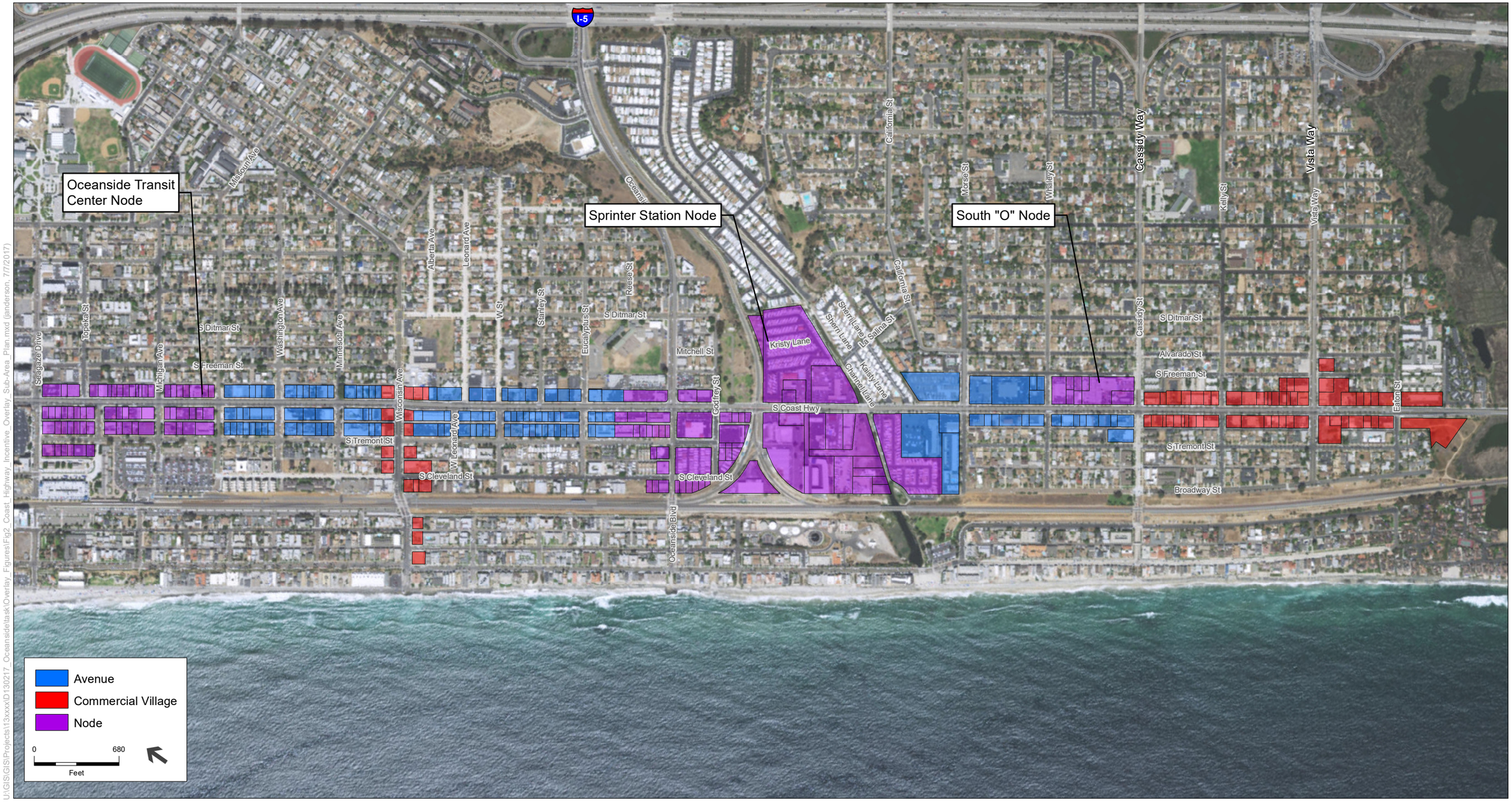
SOURCE: ESA, 2016; City of Oceanside, 2016

City of Oceanside Coast Highway Corridor Study. 130217

Map 1

Coast Highway Incentive District

Coast Highway Development Incentive Overlay



SOURCE: ESA, 2016; City of Oceanside, 2016; NAIP, 2014

City of Oceanside Coast Highway Corridor Stud. 130217

Map 2

Coast Highway Incentive District

Sub-Area Plan

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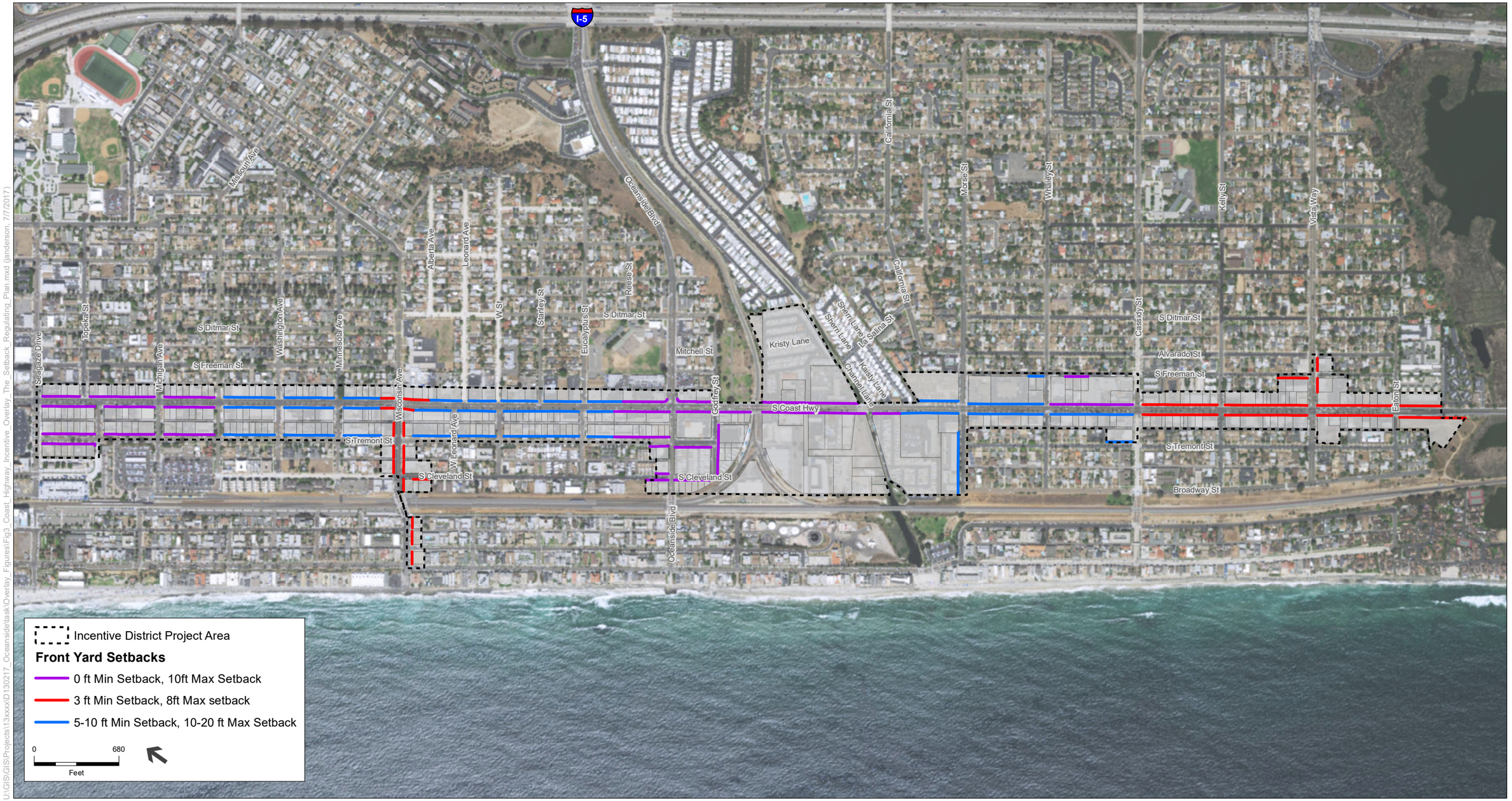

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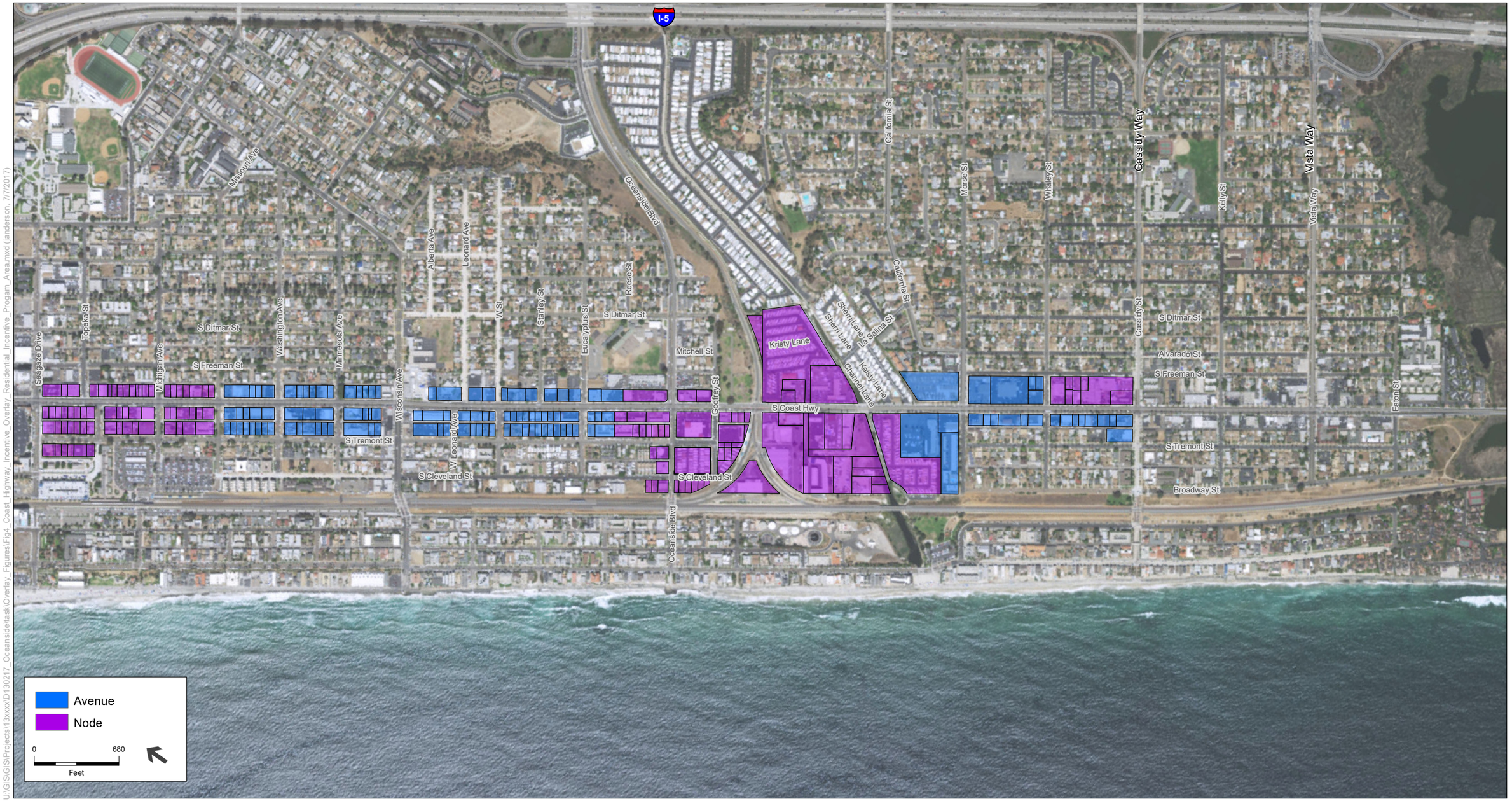
SOURCE: ESA, 2016; City of Oceanside, 2016; NAIP 2014

City of Oceanside Coast Highway Corridor Stud. 130217

Map 3

Coast Highway Incentive District

The Setback Regulating Plan



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SOURCE: ESA, 2016; City of Oceanside 2016; NAIP, 2014

City of Oceanside Coast Highway Corridor Stud. 130217

Map 4

Coast Highway Incentive District

Residential Incentive Program Area

Appendix J

General Plan and Local Coastal Program Amendments

ESA

J-1 2012 Circulation Element Text Amendments

3. MASTER TRANSPORTATION ROADWAY PLAN

The Master Transportation Roadway Plan chapter focuses on providing the guidelines to provide a network of roadways throughout the City which form the transportation network. This is important since the street system is used for vehicular, bicycle, transit, pedestrian, and goods movement. The City of Oceanside strives to create a network of complete streets that creates an environment for all users of the system. The Circulation Element and this Master Transportation Roadway Plan chapter are designed to effectively promote policies and guidelines that support the various forms of transportation available in the City of Oceanside. This chapter primarily focuses on mobility by use of the automobile; however, the design guidelines and policies for a multimodal network of complete streets are considered throughout the chapter.

The information contained within this chapter is intended to encourage design standards that promote efficiency and safety of the circulation network.

CHAPTER HIGHLIGHTS

- Policies and Implementation Strategies
- Roadway Classifications
- Existing Circulation System
- Regional Modeling Process
- Roadway Design Standards
- LOS Analysis Methodology
- Proposed 2030 Master Transportation Plan
- Recommended Overriding Considerations
- Traffic Impact Study Guidelines

3.1 Policies and Implementation Strategies

GOAL 1: ***A transportation network that supports safe and efficient travel for all modes of transportation.***

GOAL 2: ***A transportation network that is designed to accommodate the existing and future growth of the City of Oceanside.***

Level of Service and Design Standards

OBJECTIVE:

i. Aim for an acceptable Level of Service (LOS) D or better on all Circulation Element roadways on an average daily basis and at intersections during the AM and PM peak periods.

ii. Employ Vehicle Miles Traveled (VMT) as the primary metric for determining the traffic impacts for new development projects located within Smart Growth transit corridors.

iii. Ensure that all streets within the City achieve the City's mobility goals and design standards as highlighted throughout this chapter.

POLICIES:

3.19 For development within the Major Thoroughfare and Traffic Signal Fee area established by the City Council, the City shall collect the Major Thoroughfare Fees as required by Ordinance No. 80-30, the Traffic Signal Fees as required by Ordinance No. 87-19, and the latest City Council resolutions setting such fees.

3.20 If the location and traffic generation of a proposed development will result in congestion on major streets or failure to meet the LOS D threshold, or if it creates safety hazards, the proposed development shall be required to make necessary off-site improvements. Such improvements may be eligible for reimbursement from collected impact fees. In some cases, the development may have to wait until financing for required off-site improvements is available. In other cases where development would result in unavoidable impacts, the appropriate findings of overriding consideration will be required to allow temporary undesirable levels of service.

3.21 Land Use development near designated transit corridors or in VMT-efficient (Vehicle Miles Traveled) areas shall be presumed to cause a less than significant transportation impact. Transit, active transportation and rehabilitation projects that do not add motor vehicle capacity should also be presumed to cause a less than significant impact.

3.22 The City shall require that those responsible for street improvements replant, replace, or install new landscaping pursuant to existing City policy along all new roadways or on those that have been redesigned and reconstructed.

3.23 Prior to approving any street widening project, the City shall explore all alternatives to adding additional lanes or acquiring additional right-of-way.

3.2 Roadway Classifications

Roadway classification is the process by which streets and highways are grouped into classes according to the type of service they are intended to provide. Fundamental to this process is the recognition that individual streets and highways do not operate independently. Rather, most travel involves movement through an integrated network of roads. It is the City's responsibility to plan, design, and implement a street system that recognizes the importance of the use and function of each hierarchical roadway classification.

The City of Oceanside recognizes the importance of the use and function of each street classification. The class of each road has a certain set of design guidelines and intended functions that are described below.

Expressway – An Expressway is designed to provide express direct travel through a city with several lanes of travel in each direction. It is a multilane roadway that is often a divided highway for through traffic with fully controlled access to intersections and with possible grade separations at most

intersections (SR76 has mostly at-grade intersections). Expressways are constructed and maintained by the Caltrans. Expressways in Oceanside are generally four or six lanes. The Caltrans Highway Design Manual (Index 405.5) states that median opening (includes intersections) should be spaced at intervals no closer than 1,600 feet. The cross section for an expressway is 102/160 or 122/200 feet (curb-to-curb/total right-of-way width).

Prime Arterial – A Prime Arterial is designed to provide regional, sub-regional, and intra-city travel. It includes high design standards with six lanes of travel, raised and landscaped medians, 8-foot shoulders, highly restricted direct access, and on-street parking is not allowed. The cross section for a prime arterial is 104/124 feet (curb-to-curb/total right-of-way width).

Major Arterial – A Major Arterial is designed to provide intra-city and sub-regional service. Direct access is allowed, but selectively restricted to assure proper function of the roadway. Typical design standards include the provision of four or six lanes of travel with a raised and landscaped median, 8-foot shoulders for emergency parking and bike lanes, and left-turn lanes are typically protected along the roadway. The cross section of a major arterial is 80/100 feet or 104/124 feet (curb-to-curb/total right-of-way width).

Secondary Collector – A Secondary Collector is designed for intra-city travel as a link between arterial and collector roadways. It frequently provides direct access to abutting properties; however, that is not its primary purpose. The typical design features include the provision of four travel lanes with a center two-way left-turn lane and includes bike lanes or four lanes with left-turn pockets without a raised median. The cross section of a secondary collector is 64/84 (curb-to-curb/total right-of-way width) with a two-way left-turn lane and 54/74, 60/80 feet without a two-way left-turn lane.

Collector Street – A Collector Street is designed to connect local streets with the adjacent arterial street network. The design standards typically include the provision for two travel lanes and on-street parking is allowed, except in specific locations where parking is removed to provide turn lanes at intersections. Collector streets frequently provide direct access to abutting properties, although the desire is to limit access where possible to reduce conflict. Collectors are generally two lanes with or without a center two-way left-turn lane. The cross section of a collector is 50/70 (curb-to-curb/total right-of-way width) with a two-way left-turn lane and 40/60 or 50/70 feet without a two-way left-turn lane. A Collector can ~~also~~ be a two-lane one-way street, such as the one-way couplet on Mission Avenue between Cleveland Street and Clementine Street with Seagaze Drive. A Collector Street may also be separated by a median with commercial land uses fronting or at an entry way to a residential development. A Collector that is a two-lane one- way street generally has parking on both sides of the street.

Local Street – A Local Street is designed to provide direct access to abutting properties and to provide connection between neighborhood streets and the collector street network. The Local Street may be discontinuous to discourage through trips. The typical design standards include the provision for two travel lanes, parking lanes on both sides of the street, and direct driveway access. The cross section of a local street is 36/56 or 40/60 (curb-to-curb/total right-of-way width).

3.6 LOS Analysis Methodology

The efficiency of traffic intersection operations and available and utilized capacity of roadways are measured in terms of Level of Service (LOS). The LOS refers to the quality of traffic flow along roadways and at intersections. Evaluation of roadways and intersections involves the assignment of grades from A to F, with LOS A representing the lowest level of congestion, and LOS F representing extremely crowded and restricted operations. Each letter grade corresponds to a range of volume to capacity (V/C) values. The values for roadways are presented as volume to capacity ratios or vehicle demand divided by the roadway capacity. Therefore, as the ratio approaches a 1.00 capacity, the roadway approaches LOS F.

Senate Bill 743 (SB 743) requires public agencies in the State of California to change how transportation impacts are assessed under the California Environmental Quality Act (CEQA), identifying the use of Vehicle Miles Traveled (VMT) as the primary metric for determining the transportation impact of new development projects. Because new metrics and guidelines in response to SB 743 have not yet been adopted by the State, the VMT analysis this Circulation Element is for reference purposes. When a final VMT methodology is adopted by the State, the City of Oceanside will implement the new VMT metric in Smart Growth transit corridors for new development projects.

3.6.1 Freeways and Ramps

Freeways and associated interchanges must be evaluated since all freeways are on the Congestion Management Program system. All signalized intersections of freeway ramps with arterials should be evaluated using the Highway Capacity Manual (HCM) signalized intersection operational method (see section 3.6.3). For diamond interchanges, the timing and phasing of the two signals must be coordinated to ensure queue clearances. Signal timing sheets should be requested from Caltrans or the City of Oceanside. Freeways impacted by a proposed project should be evaluated for significant impacts. Level of service (generally used by Caltrans) for freeways are categorized in Table 3-2.

If ramp metering is present at a freeway interchange, the effects of the metering should be analyzed. The analysis input and output for ramp metering is explained in the Traffic Impact Study (TIS) component guidelines which are included in Appendix G. In addition, the thresholds for a significant impact to ramps or freeways are included in Appendix G.

TABLE 3-3
CIRCULATION ELEMENT ROADWAY CLASSIFICATION LOS & CAPACITY

Class	Lanes	Cross Section[1]	Level of Service				
			A	B	C	D	E
Expressway	6	102/160 122/200	30,000	42,000	60,000	70,000	80,000
Expressway	4	102/160 122/200	25,000	35,000	50,000	55,000	60,000
Prime Arterial	6	104/124	25,000	35,000	50,000	55,000	60,000
6-Lane Major Arterial	6	104/124	20,000	28,000	40,000	45,000	50,000
5-Lane Major Arterial[2]	5	102/122	17,500	24,500	35,000	40,000	45,000
4-Lane Major Arterial	4	80/100	15,000	21,000	30,000	35,000	40,000
Secondary Collector (4 lanes with 2-way left-turn lane)	4	64/84	10,000	14,000	20,000	25,000	30,000
Secondary Collector (4 lanes without 2-way left-turn lane, with left turn pockets)	4	54/74, 60/80	9,000	13,000	18,000	22,000	25,000
Commercial Collector (2 lanes with median island and roundabouts)[3]	2	56/80	10,000	11,700	13,400	15,000	19,000
Collector (commercial fronting, 2-lanes with 2-way left-turn lane)[4]	2	50/70	5,000	7,000	10,000	13,000	15,000
Collector (residential streets in the Circulation Element or industrial fronting)	2	40/60, 50/70	4,000	5,500	7,500	9,000	10,000
Local Street (residential streets NOT in the Circulation Element)	2	36/56, 40/60	—	—	2,200	—	—

Footnotes:

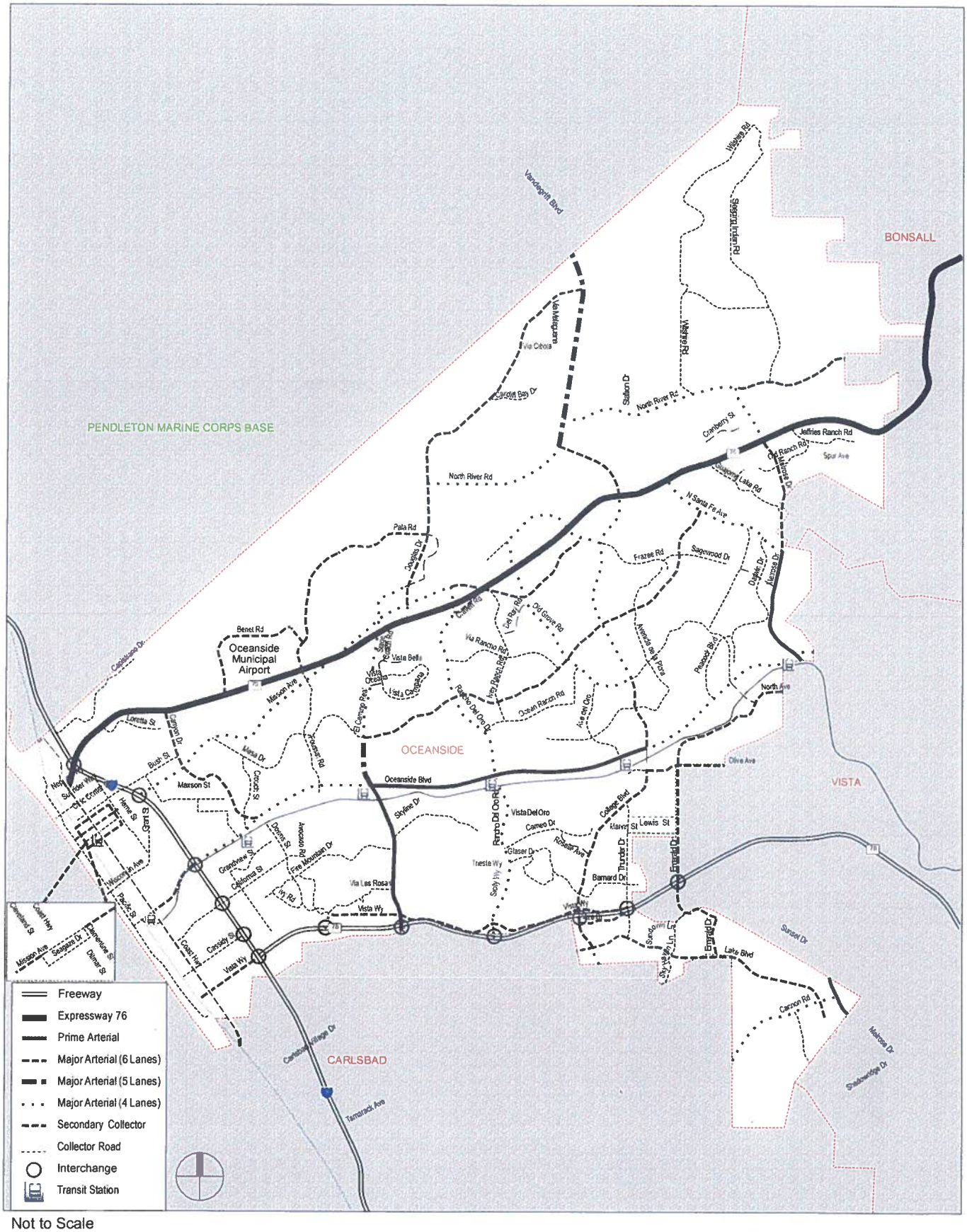
1. Cross sections are listed as curb-to-curb width/total right-of-way width, in feet.
2. Vandegrift Boulevard and El Camino Real are the only Circulation Element roadways designated as a 5-lane Major Arterial. It is not intended that other roadways be built to 5-lane Major Arterial standards.
3. This capacity is to be applied to 2-lane sections of Coast Highway.
4. This capacity will also be assumed for a two-lane one-way collector.

- College Boulevard is six-lanes between Old Grove Road and Vista Way
- Melrose Drive is connected between North River Road and SR76
- Melrose Drive is connected between Spur Avenue and N. Santa Fe Avenue
- Pala Road is connected between Los Arbolitos Boulevard and Foussat Road
- Mission Avenue is a one-way couplet between Cleveland Street and Clementine Street with Seagaze Drive (Clementine Street will be one-way northbound and Cleveland Street will be one-way southbound)

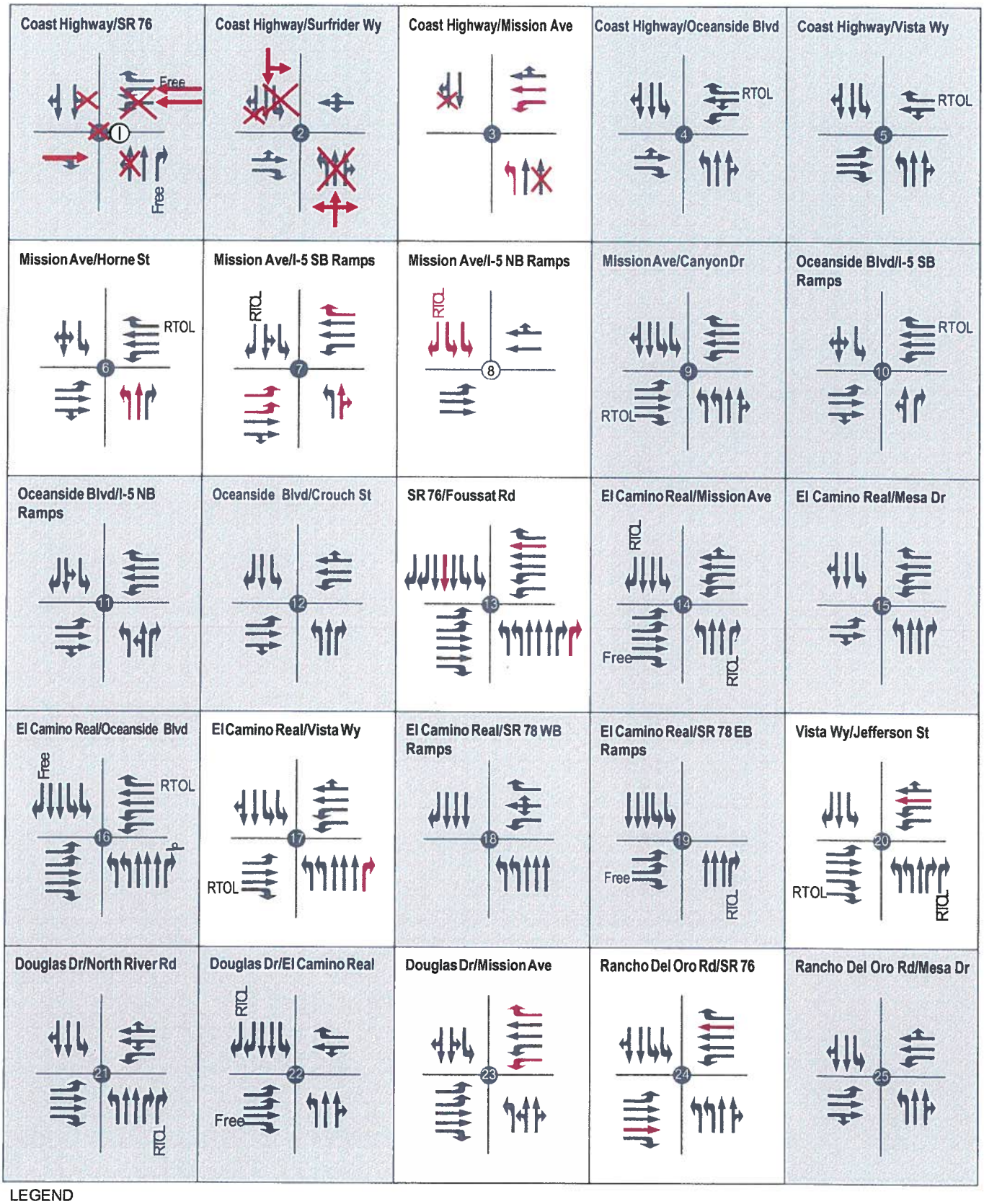
In addition to the major network changes, there are several other network improvements proposed for the 2030 Master Transportation Roadway Plan. Table 3-6 highlights the changes from the existing network to the proposed 2030 network. Several facilities are already built to their ultimate classification and are therefore not mentioned in Table 3-6. Intersection improvements beyond existing conditions are depicted in Figure 3.6 (page 33-34). Figure 3.6 shows the future intersection geometry in red. A complete list of roadway segment classification, forecast 2030 traffic volumes, delay and LOS are included in Appendix E.

TABLE 3-6
2030 PROPOSED CLASSIFICATION CHANGES
(COMPARED TO EXISTING)

Facility	Existing		2030 Proposed	
	# Lanes	Classification	# Lanes	Classification
Canyon Dr: Mission Ave to Oceanside Blvd	2	Collector	4	Secondary Collector
Coast Hwy: Harbor Dr to SR76	2	Collector	4	Secondary Collector
Coast Hwy: SR76 to South City Limits	4	Secondary Collector	2	Commercial Collector
College Blvd: Old Grove Rd to Waring Rd	4	Major	6	Major
Douglas Dr: Vandegrift Blvd to Cardiff Bay Dr[1]	2	Collector	4	Secondary Collector
El Camino Real: Mesa Dr to Oceanside Blvd	4	Major	5	Major
Lake Blvd: Thunder Dr to Sundown Ln[2]	2	Collector	4	Secondary Collector
Melrose Dr: North River Rd to SR76	-	-	4	Major
Melrose Dr: SR76 to N. Santa Fe Ave[3]	4/6	Major	6	Major
Melrose Dr: N. Santa Fe Ave to Oceanside Blvd	4	Major	6	Prime
Melrose Dr: Oceanside Blvd to City Limits	4	Major	6	Prime


PENDLETON MARINE CORPS BASE
BONSALL
OCEANSIDE
VISTA
CARLSBAD
Oceanside Municipal Airport
Vandegrift Blvd
Via Mercancia
Via Cibola
Stallion Dr
North River Rd
Cranberry St
Jeffries Ranch Rd
Old Ranch Rd
Spur Ave
Old Melrose Dr
Wisteria Ranch Rd
Wisteria Rd
Mission Rd
Rancho Del Oro Dr
Lawrence Welk Dr
Lake Rd
Old Grove Rd
Via Rancho Rd
Via Rancho Pkwy
Ocean Ranch Rd
Ave del Oro
Avenida de la Plata
Peacock Blvd
North Ave
Olive Ave
Oceanside Blvd
Skyline Dr
Vista Del Oro
Cameo Dr
Glaser Dr
Roselle Ave
Thunder Dr
College Blvd
Marvin St
Lewis St
Emerald Dr
Barnard Dr
Trieste Wy
Sicily Wy
Vista Wy
Via Las Rosas
Ivy Rd
Sunset Dr
Lake Blvd
Canyon Rd
Melrose Dr
Shadowridge Dr
Carlsbad Village Dr
Tamarack Ave
Cassidy St
Coast Hwy
Pacific St
Wisconsin Ave
Grandview St
California St
Downs St
Avocado Rd
Fire Mountain Dr
Hemlock St
Santa Fe St
Bush St
Marson St
Mesa Dr
Crouch St
Mission Ave
Lorena St
Canyon Dr
Caledonia Dr
Benet Rd
Douglas Dr
Pala Rd
Frazee Rd
Sagewood Dr
Daphne Dr
Melrose Dr
N Santa Fe Ave
Spur Ave
Freeway
Expressway 76
Prime Arterial
Major Arterial (6 Lanes)
Major Arterial (5 Lanes)
Major Arterial (4 Lanes)
Secondary Collector
Collector Road
Interchange
Transit Station

Not to Scale



LEGEND

NS Street/EW Street

EW

NS

● Study Intersection - Signalized

○ Study Intersection - Unsignalized

Study Intersection Number

RTOL Right-turn overlap

Lane Geometry

Stop Sign Control

Unshaded intersection and red coloring indicates a geometric change from the Existing intersection geometry

2030 Master Transportation Roadway Plan Intersection Geometry

Figure 3.6

3.7.1 Unacceptable LOS Roadway Segments

There are several segments in the proposed 2030 Master Transportation Roadway Plan that do not operate at an acceptable LOS D or better and the mitigation measures to improve the operations to an acceptable level of service are not considered feasible. Figure 3.7 (page 38) depicts the 2030 Master Transportation Roadway Plan traffic volumes. Figure 3.8 (page 39) depicts the level of service operations for the roadway network for the 2030 Master Transportation Roadway Plan. As forecast traffic volumes build on the major corridors such as Coast Highway, College Boulevard, El Camino Real and Oceanside Boulevard, traffic should be managed through the Transportation Management Center (TMC). This will not provide full mitigation but simply improve overall traffic flow along these segments. The potential mitigation measures necessary to bring these segments to an acceptable LOS D or better are not always feasible or do not work towards achieving the overall long-term goals for the City of Oceanside. However, it is noted what would be required to fully mitigate these segments. The following are City of Oceanside roadway segments that do not operate at an acceptable LOS D or better under the proposed 2030 Master Transportation Roadway Plan.

Coast Highway between ~~Wisconsin Avenue and Oceanside Boulevard~~ Harbor Drive and Seagaze Drive and between Oceanside Boulevard and Morse Street.

- Capacity: Commercial ~~Secondary~~ Collector with LOS E capacity of ~~25,000~~ 19,000 *(see Table 3-3 for roadway capacities)*
- LOS: Forecast 23,~~6~~300 ADT volumes, LOS E, V/C ratio ~~0.94~~ 1.23
- Mitigation: ~~Widening to a four-lane secondary collector with a center two-way left-turn lane would accommodate forecast traffic volumes~~ convert to one lane each direction with roundabouts and bicycle lanes to provide for other mode choices along Coast Highway, such as transit, bicycle and walking.

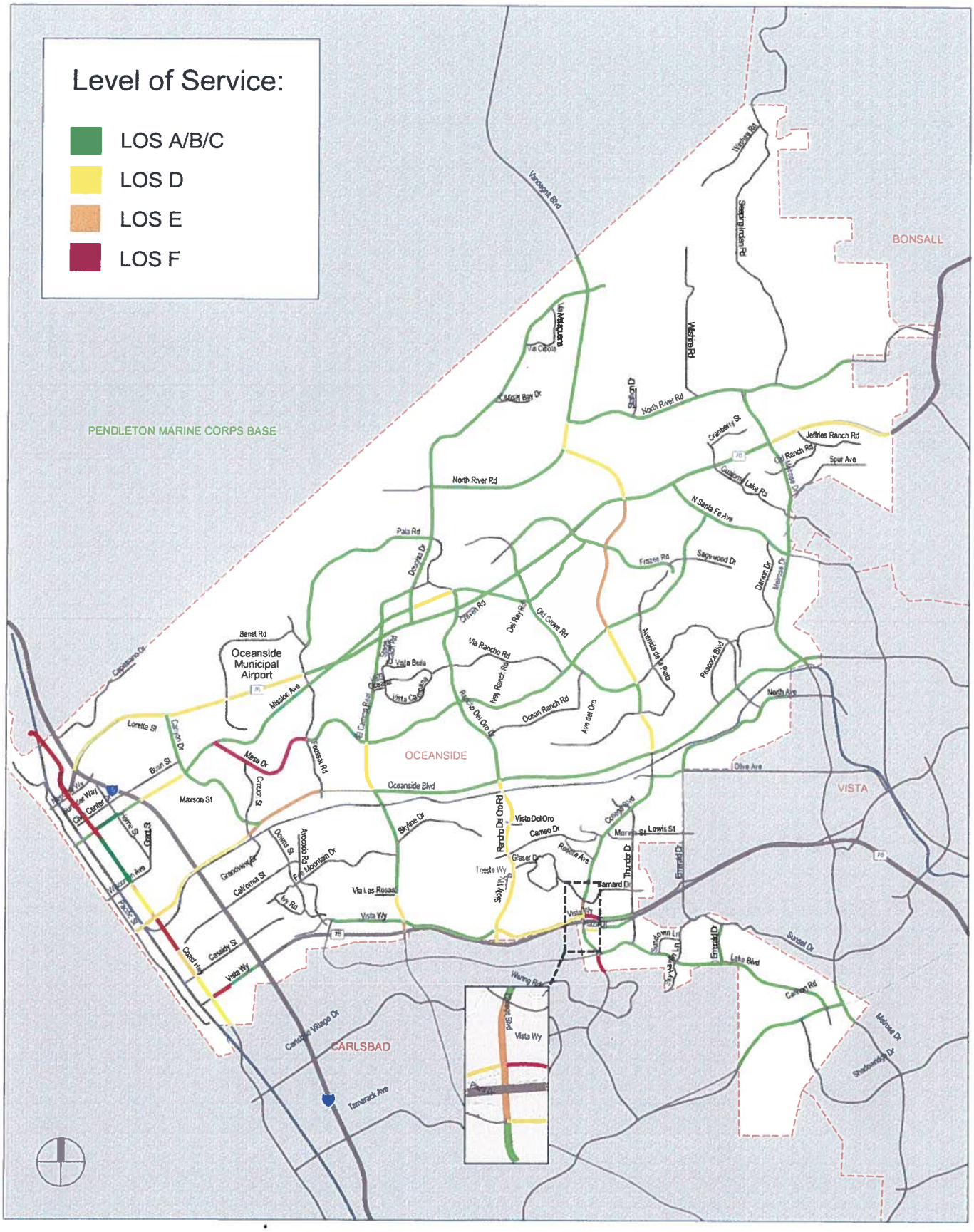
College Boulevard between SR76 and Mesa Drive, Oceanside Boulevard and Olive Drive, Waring Road and Plaza Drive, and Lake Boulevard and Southern City Limits

- Capacity: Four-lane major between SR76 and Mesa Drive, six-lane major between Oceanside Boulevard and Olive Drive, and Waring Road and Plaza Drive, and four-lane major between Lake Boulevard and the Southern City Limits
- Capacity: Four-lane major LOS E capacity of 40,000 and six-lane major LOS E capacity of 50,000
- LOS: Forecast between 36,300-52,000 ADT volumes, LOS E and F, V/C ratio 0.91-1.04
- Mitigation: Widening the four-lane major sections (where there is an impact) to a six-lane major or widening the six-lane major sections (where there is an impact) to a six-lane prime arterial would accommodate forecast traffic volumes; however, residents on certain sections of College Boulevard would be impacted by widening this corridor.

3.7.2 Unacceptable LOS Intersections

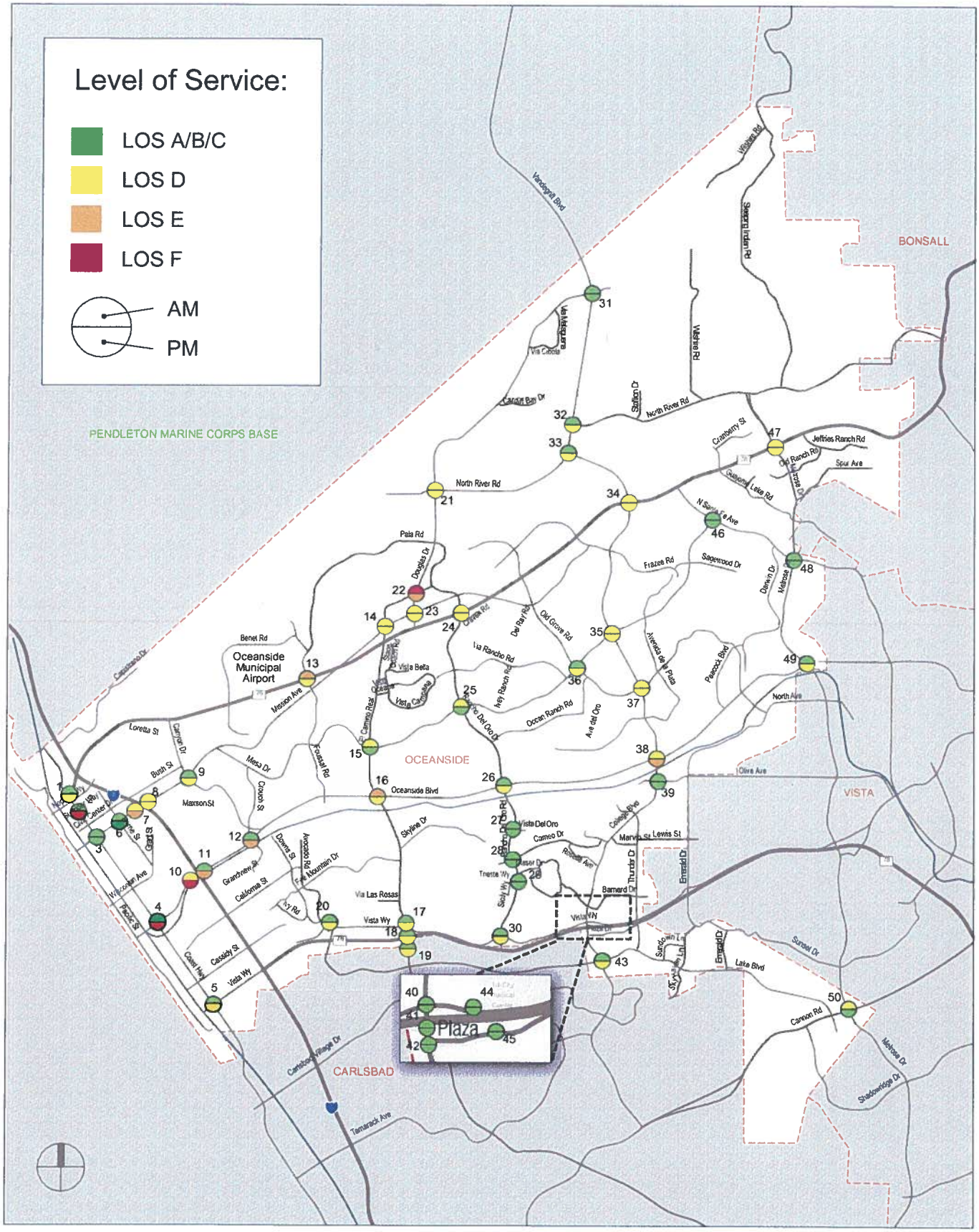
In addition, there are several key intersections in the proposed 2030 Master Transportation Roadway Plan that do not operate at an acceptable level of service during peak hours. Figure 3.9 (page 40) depicts the level of service operations for the key intersections for the proposed 2030 Master Transportation Roadway Plan. Below is a list of intersections that operate at LOS E or F during the AM or PM peak hours. The potential mitigation measures for the intersections that are proposed to operate at LOS E or F include adding an additional thru, left, or right-turn lanes to the necessary leg of the intersection. The intersection level of service, delay, and list of potential mitigation measures for these intersections are included in Appendix F.

- Mission Avenue and I-5 Southbound Ramps (PM peak hour)
- Oceanside Boulevard and I-5 Northbound & Southbound Ramps ((PM peak hour)
- Oceanside Boulevard and Crouch Street (PM peak hour)
- SR76 and Foussat Road (AM peak hour)
- El Camino Real and Oceanside Boulevard (AM peak hour)
- Douglas Drive and El Camino Real (AM and PM peak hours)
- College Boulevard and Oceanside Boulevard (PM peak hour)
- Coast Highway and Vista Way (PM peak hour)



2030 Master Transportation Roadway Plan
Roadway Level of Service

Figure 3.8



2030 Master Transportation Roadway Plan
Intersection LOS Operations

Figure 3.9

3.7.3 Recommended Overriding Considerations

The following segments and intersection are recommended for consideration by City Council for an overriding consideration with the adoption of this Circulation Element. The mitigation measures identified for these segments have significant land use or environmental impacts that prohibit a feasible mitigation to bring the facility to an acceptable level of service.

Roadway Segments:

Coast Highway between ~~Wisconsin Avenue and Oceanside Boulevard~~ Harbor Drive to Seagaze Drive

The Master Transportation Roadway Plan shows this segment as a four-lane secondary collector. ~~It would require a four-lane 64/84 secondary collector designation without the existing on-street parking to accommodate the forecast traffic volumes. The new TMC can be used to manage the transportation system through adaptive signals on congested corridors.~~ This segment of Coast Highway will be converted to a Complete Street with one lane in each direction separated by a center median island with roundabouts at key intersection locations to facilitate continuous and slow traffic flows.

Coast Highway between Oceanside Boulevard and Cassidy Street
The Master Transportation Roadway Plan shows this segment as a four-lane secondary collector with a two-way left turn lane on Coast Highway between Oceanside Boulevard and Morse Street. This segment of Coast Highway will be converted to a Complete Street with one lane in each direction separated by a center median island and two-way left turn lane with roundabouts at key intersection locations to facilitate continuous and slow traffic flows.

College Boulevard between SR76 and Mesa Drive

The Master Transportation Roadway Plan shows this segment as a four-lane major arterial. It would require a six-lane major arterial designation to accommodate the forecast traffic volumes. The new TMC can be used to manage the transportation system through adaptive signals on congested corridors.

College Boulevard between Oceanside Boulevard and Olive Drive

The Master Transportation Roadway Plan shows this segment as a six-lane major arterial. It would require a six-lane prime arterial designation to accommodate the forecast traffic volumes. The new TMC can be used to manage the transportation system through adaptive signals on congested corridors.

College Boulevard between Waring Road and Vista Way

The Master Transportation Roadway Plan shows this segment as a six-lane major arterial. It would require a six-lane prime arterial designation to accommodate the forecast traffic volumes. The new TMC can be used to

Vista Way between Coast Highway and Ditmar Street

The Master Transportation Roadway Plan shows this segment as a four-lane secondary collector with a two-way left turn lane. A four-lane secondary collector with a two-way left turn lane would be required to accommodate the forecast traffic volumes. This segment of Vista Way has existing residential dwelling units that front Vista Way. There is a history of speeding and safety complaints from the residents. The City reduced the number of lanes on this segment of Vista Way to help slow traffic speeds and improve safety conditions.

Intersections:

Mission Avenue and I-5 SB Ramps

The new TMC can be utilized to manage traffic on Mission Avenue; however, it cannot be determined that the use of the TMC and adaptive signal controls will fully mitigate this intersection. It would require providing three thru lanes both east- and westbound and two westbound left-turn lanes to fully mitigate this intersection. This would require widening the Mission Avenue bridge over I-5. The Caltrans I-5 widening project plans show the Mission Avenue bridge remaining as four lanes.

Oceanside Boulevard and I-5 SB Ramps

The new TMC can be utilized to manage traffic on Mission Avenue; however, it cannot be determined that the use of the TMC and adaptive signal controls will fully mitigate this intersection. It would require providing three thru lanes both east- and westbound, two westbound right-turn lanes, and two eastbound left-turn lanes to fully mitigate this intersection.

Oceanside Boulevard and I-5 NB Ramps

The new TMC can be utilized to manage traffic on Mission Avenue; however, it cannot be determined that the use of the TMC and adaptive signal controls will fully mitigate this intersection. It would require providing three thru lanes both east- and westbound to fully mitigate this intersection.

Oceanside Boulevard and Crouch Street

The new TMC can be utilized to manage traffic on Mission Avenue; however, it cannot be determined that the use of the TMC and adaptive signal controls will fully mitigate this intersection. It would require providing three thru lanes both east- and westbound to fully mitigate this intersection.

SR76 and Foussat Road

This intersection cannot be fully mitigated in the AM peak hour, but providing two right-turn lanes northbound and three thru lanes southbound will improve the peak hour operations.

El Camino Real and Oceanside Boulevard

The new TMC can be utilized to manage traffic on Mission Avenue; however, it cannot be determined that the use of the TMC and adaptive signal controls will fully mitigate this intersection. It would require providing three thru lanes both east- and westbound to fully mitigate this intersection.

Douglas Drive and El Camino Real

The new TMC can be utilized to manage traffic on Mission Avenue; however, it cannot be determined that the use of the TMC and adaptive signal controls will fully mitigate this intersection. It would require providing three thru lanes southbound, two thru lanes and one dedicated right-turn lane northbound, and on dedicated left-turn and one dedicated thru-lane westbound to fully mitigate this intersection. There is also not sufficient right-of-way at this intersection to provide the recommended mitigation measures.

College Boulevard and Oceanside Boulevard

The new TMC can be utilized to manage traffic on Oceanside and College Boulevard; however, it cannot be determined that the use of the TMC and adaptive signal controls will fully mitigate this intersection. It would require providing two eastbound right-turn lanes to fully mitigate this intersection.

Coast Highway and Vista Way

Two northbound travel lanes through the intersection would be necessary to mitigate the failing PM peak hour condition. This would require one through lane, a shared through and right turn lane and a dedicated left turn pocket.

3.8 Traffic Impact Studies

3.8.1 Traffic Impact Study Guidelines

The SANTEC/ITE Guidelines for Traffic Impact Studies (TIS) in the San Diego Region, March 2000 (or most recent version) shall be followed within the City of Oceanside for any proposed project that would have an impact on the City's roadway network. A TIS can also be required based on the discretion of the City. Early consultation between the developer and the City is required to establish the base study parameters, assumptions, and analysis methodologies for the TIS. The City of Oceanside has a list of required components for TIS reports. All TIS reports should follow the required TIS components guidelines which are included in Appendix G. A TIS can be performed by any consultant on the City approved Traffic Engineering Consultants list to complete development traffic impact studies.

As recommended in the SANTEC/ITE Guidelines, the use of the most recent version of the SANDAG Trip Generation rates should be used or the rates from ITE's latest Trip Generation manual. For smart growth/mixed-use development areas, SANDAG has developed a Trip Generation for Smart Growth: Planning Tools for the San Diego Region to identify trip generation rates associated with smart growth developments. This new method of applying Smart Growth trip generation rates is intended to supplement data in the San Diego Traffic Generators Manual, published by SANDAG in 2000, and the accompanying Not-so-Brief-Guide to Trip Generation, published by SANDAG in 2002. The most recent version of the SANDAG Smart Growth or Trip Generation rates should be used.

In addition, Senate Bill 743 (SB 743) requires public agencies in the State of California to change how transportation impacts are assessed under the California Environmental Quality Act (CEQA), identifying the use of Vehicle

Miles Traveled (VMT) as the primary metric for determining the transportation impact for new development projects. Because new metrics and guidelines in response to SB 743 have not yet been adopted by the State, the VMT discussion in this Circulation Element is presented for reference purposes only. Traditional intersection and roadway segment level of service analysis will remain the current metric used by the City of Oceanside to determine transportation impacts under CEQA until the new metrics and guidelines are developed and adopted in the San Diego region through SANDAG.

The Governor's Office of Planning and Research (OPR) released the *Revised Proposal on Updates to the CEQA Guidelines of Evaluating Transportation Impacts in CEQA* in January 2016. This document outlines OPR's recommendations regarding methodology for conducting VMT analysis and establishing thresholds for determining significant transportation impacts as part of CEQA analysis for new projects. The recommendations include:

- Vehicle Miles Traveled is the primary metric for determining transportation impacts across the State
- Land use development near transit or in VMT-efficient areas should be presumed to cause a less than significant transportation impact
- Transit, active transportation, and rehabilitation projects that do not add motor vehicle capacity should also be presumed to cause a less than significant impact
- Implementation should be phased over time

Implementation of the new VMT metric in the City of Oceanside will be limited to mixed-use transit corridors. The VMT analysis will be conducted using the SANDAG regional travel demand model, which considers a variety of factors related to the land use and transportation condition to determine mode of travel choice and VMT. The traditional intersection and roadway level of service analysis remain the current metric until the State releases final guidelines on how VMT to is to be modeled.

3.8.2 Traffic Analysis Performance Criteria

The City of Oceanside's minimum acceptable level of service for all roadways is LOS D. The values associated with the LOS D minimum for the different roadway classifications are defined in Table 3-3 (page 27). The minimum acceptable level of service for intersections during the peak periods is LOS D. The values associated with LOS D for intersections during the peak periods were previously defined in Tables 3-4 and 3-5 (pages 28 & 29). These level of service standards are considered acceptable within the San Diego region and have been used in the analysis for the Circulation Element.

3.8.3 Mitigation Measures

Any proposed development project that causes a street segment or intersection to operate worse than LOS D is a significant project impact. If a segment or intersection operates at LOS E or F under pre-project conditions, a significant impact is determined as outlined in the most recent version of the SANTEC/ITE Guidelines. The developer shall propose, prepare and provide

feasible mitigation measure(s) for the City to review that would improve the impacted location(s) to an acceptable LOS. Mitigation measures should be used to construct on- and off-site transportation infrastructure improvements and dedicate right-of-way connected to impacts resulting from new development. The City also may require a developer to provide improvements to pedestrian and/or bicycle facilities as part of the project's mitigation measures. Chapters 6 and 7 focus on the Pedestrian and Bicycle Facility networks in the City of Oceanside.

Any proposed development project that affects a street segment that already operates, or is projected to operate worse than LOS D, regardless of peak hour analysis, the developer shall propose, prepare and provide mitigation measure(s) for the City to review. If there are no feasible mitigation measures that would fully mitigate traffic impacts, the developer shall propose, prepare and provide various mitigation measures, such as Traffic Management Center tools and resources, which may not include physical improvements to the impacted facility. Where various mitigation measures have been prepared, agreed upon by the City, and will be implemented, yet are not sufficient to fully mitigate the traffic impacts, then LOS E during peak hour periods will be considered acceptable. A project's fair share contributions may also be considered by the City for predetermined project improvements (e.g. TMC, adaptive signals) in lieu of prepared and implemented mitigation measures.

3.9 Additional Recommended Transportation Network Guidelines

The following recommended guidelines are for action by the City:

1. Adopt and implement new VMT guidelines from the State Office of Planning and Research (OPR) and regional travel demand modeling for VMT analysis within mix-use transit corridors.

2. Develop and implement a Traffic Engineering Consultant on-call list for potential developers to utilize for traffic impact studies.

3. Implement the proposed transportation network and street classification standards as shown on Figure 3.5 (page 32).

4. As more precise intersection data becomes available, incorporate special design treatments for mitigating potentially unacceptable levels of service at those intersections identified in Section 3.7.2 (page 37) and included in Appendix F.

5. Continue to impose the City's Thoroughfare Fee and Traffic Signal Fee Ordinances to fund improvements necessary to maintain acceptable levels of service.

6. Update and revise the City's Thoroughfare Fee and Traffic Signal Fee Ordinances periodically to include road segment and intersection improvements as necessary to maintain acceptable LOS, and make any necessary adjustments in the amount of fees to be imposed.

daily. iCommute offers assistance and tools to commuters and employers through various services such as carpool, vanpool, schoolpool, transit, bike to work, and work from home programs.

Carpool – Carpooling shares the daily commute with another driver. iCommute offers RideMatcher, which is a database of thousands of commuters looking for carpool partners. TripTracker allows the individual commuter to track carpool trips and see the cost and environmental savings. The iCommute Carpool program also offers a Guaranteed Ride Home Program for those who carpool three or more times each week. And, park-and-ride lots are free and available for those who carpool or vanpool. Oceanside currently has four park-and-ride lots at the following locations:

- SR78/College Boulevard South (3700 Haymar Drive)
- Moreno Street (1928 Moreno Street)
- SR78/College Boulevard North (3710 Vista Way)
- Frontier Drive/New Hope Church (Mission Avenue and Frontier Drive)

Vanpool – Vanpools allow groups of 7 to 15 people to share their commute to work. A van can be leased by the commuter or an employer through one of iCommute's contracted vanpool vendors and receive up to $400 per month to help offset the cost of the lease. The RideMatcher, TripTracker, Guaranteed Ride Home, and Park and Ride Lots are all available to vanpool commuters as well.

SchoolPool – This is iCommute's free carpool matching service for parents of children who attend the same school anywhere in the region. iCommute has helped to establish SchoolPool programs at elementary, middle, and high schools throughout the region.

Transit – Public transportation service is available throughout the region, including Oceanside. iCommute offers a link to 511's Transit Trip Planner to plan a commute using the public transportation available in the San Diego region.

Local Circulator – A local circulator within the Coast Highway corridor such as streetcars like those found in Old Town San Diego, can provide transportation options and connection to popular destinations. Providing local circulation between parking areas and destination points along the coast assists in enhancing the overall parking experience. These systems can promote walkability and can reduce traffic congestion. Funding mechanisms can be secured through public and/or private means and can enhance economic vitality for the Coast Highway corridor. A circulator shuttle operating between the Downtown area and Oceanside Boulevard is recommended, as this segment of Coast Highway typically has the highest concentration of development and parking demand within the corridor.

Bike to Work – iCommute will help a commuter find a ride partner, as well as connect the commuter with a free bike locater and map out the best route of travel. There are even some financial incentives offered through certain

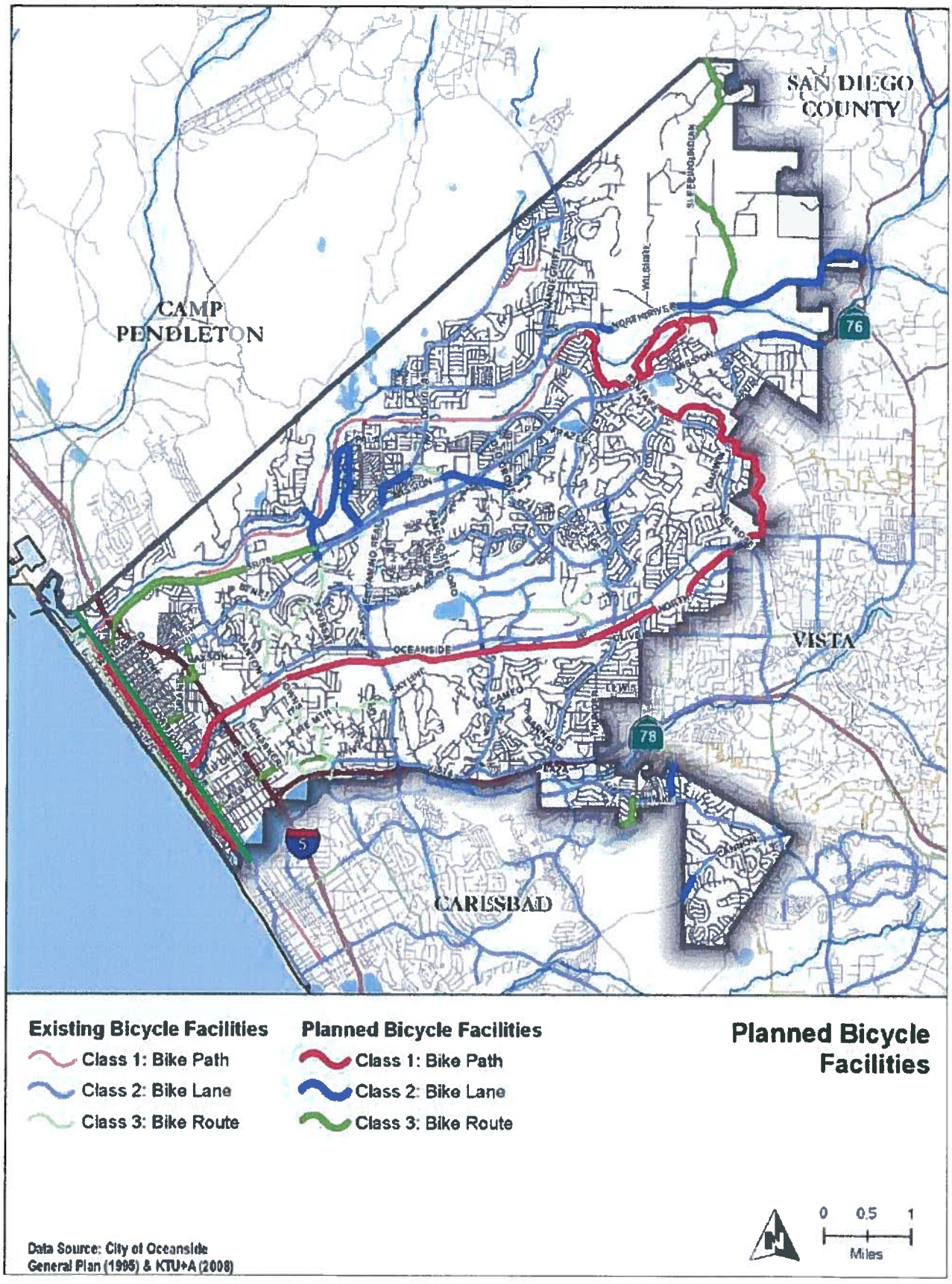


Figure 6.2

Oceanside Planned Bicycle Facilities

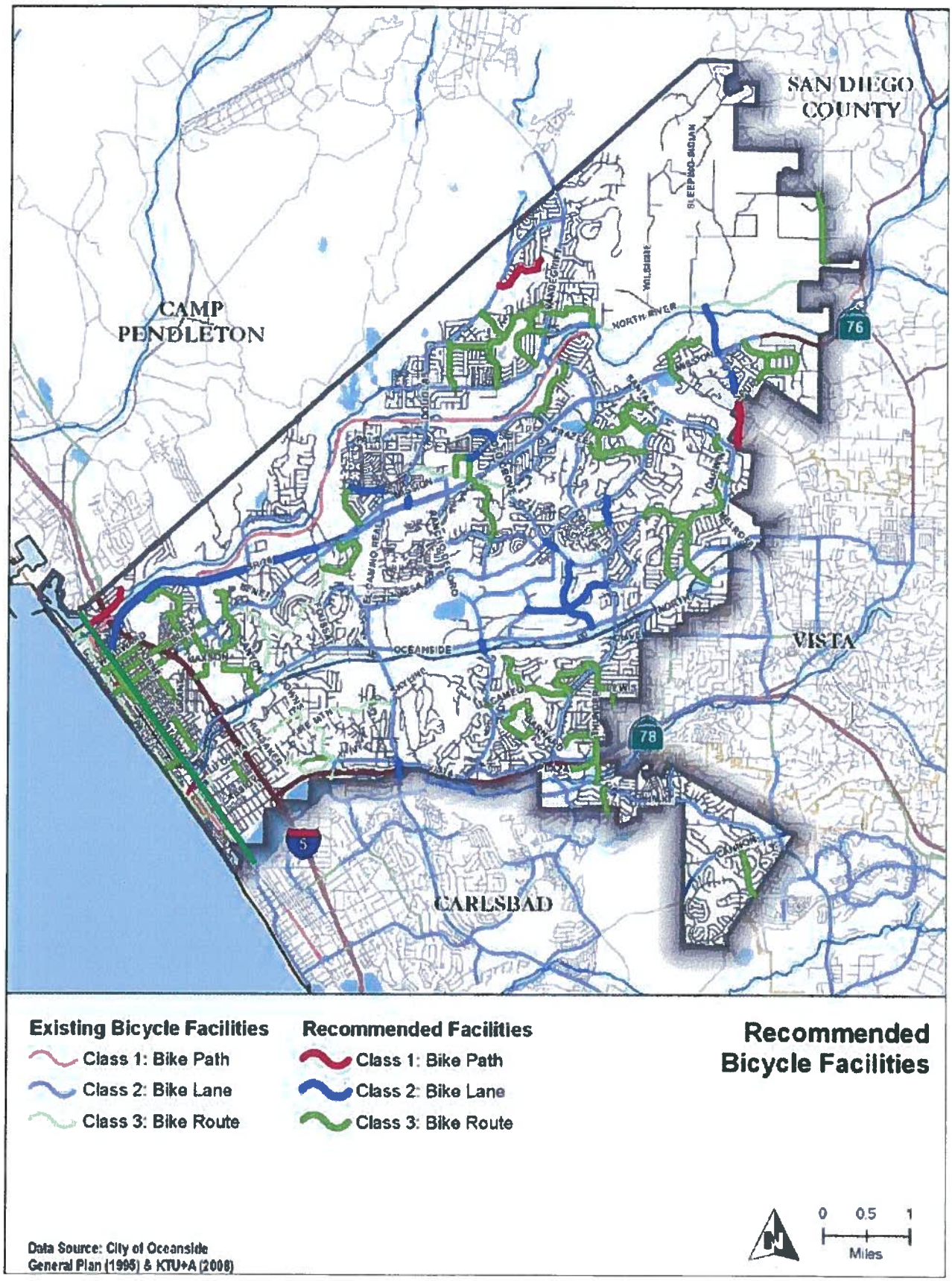

SAN DIEGO COUNTY
CAMP PENDLETON
OCEANSIDE
VISTA
CARLSBAD
76
78
5
Existing Bicycle Facilities
Class 1: Bike Path
Class 2: Bike Lane
Class 3: Bike Route
Recommended Facilities
Class 1: Bike Path
Class 2: Bike Lane
Class 3: Bike Route
Recommended Bicycle Facilities
0 0.5 1
Miles
Data Source: City of Oceanside General Plan (1995) & KTU+A (2008)

Figure 6.3

J-2 Land Use Element Amendments

LAND USE ELEMENT

CITY OF OCEANSIDE, CALIFORNIA

Prepared by

Planning Department
City of Oceanside

Approved by

Planning Commission
City of Oceanside
July 7, 1986
Resolution No. 86-P61

Adopted by

City Council
City of Oceanside
September 10, 1986

Amended by

City Council
City of Oceanside
Resolution No. 86-272 - 10/29/86
Resolution No. 86-279 - 11/12/86
Resolution No. 88-133 - 5/25/88
Resolution No. 88-253 - 11/2/88
Resolution No. 88-273 - 12/7/88
Updated Text - January 1989

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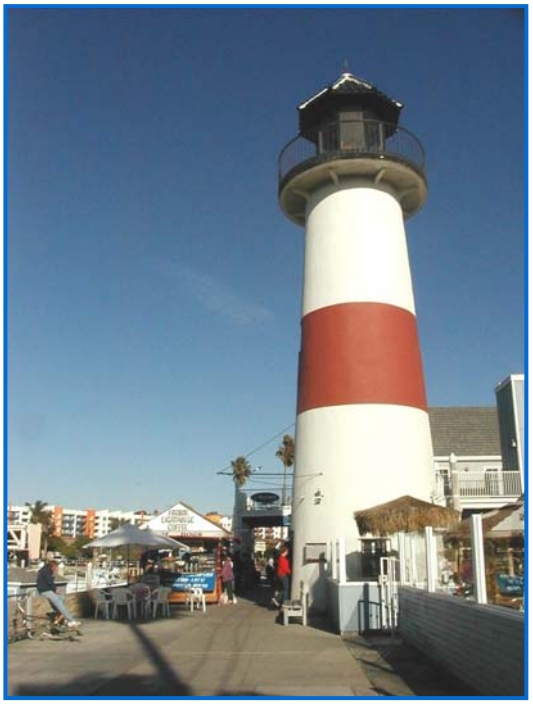
LAND USE ELEMENT

INTRODUCTION

The Land Use Element and associated Land Use Map are guides to land use planning within the City of Oceanside and affect many of the issues addressed in the other General Plan elements. The Land Use Element and Land Use Map identify the type and location of future land uses within the City. The specific land uses in turn affect the remaining General Plan elements. For example, the type and location of land uses identified in the Land Use Element and Map affect the circulation system that is outlined in the Circulation Element, and the community facilities management objectives and policies identified in the Land Use Element affect the Community Facilities Element plan. The land uses identified in the Land Use Element and Map also reflect the community's goals for its future form and character.



Purpose and Authority

As a city, State law requires that Oceanside prepare and adopt a General Plan as a tool to manage growth and development. The Land Use Element is a mandatory element or chapter of the General Plan.

The purpose of the Land Use Element is to describe present and planned land use activity that has been designed to achieve the community's long-range objectives for the future. The Land Use Element and Map identify the proposed general distribution, location, and extent of land uses such as industrial, commercial, residential, institutional, agricultural, open space, and community facilities. The element contains goals, objectives, policies, and implementation programs, along with maps and diagrams that outline the future land uses within the City and within specific planning areas. The element also provides direction related to how future development will occur, such as the intensity/density and character of new development. The element also addresses the relationship between development, community enhancement, and natural resource management.

The Land Use Element of the Oceanside General Plan represents the City's desire for long-range changes and enhancements of land uses. The objectives and policies in this element establish the constitutional framework for future land use planning and decision making in Oceanside.

Scope and Content

The Land Use Element is mandated by State law. The Element is comprised of three sections: 1) Introduction, 2) Long-Range Policy Direction, and 3) Land Use Plan. In the Long-Range Policy Direction section, major issues within the community are addressed through goals, objectives, and policies. The objectives, which are overall statements of the community's desires, are comprised of broad statements of purpose and direction. The policies serve as guides for reviewing development proposals, planning facilities to accommodate growth, and accomplishing community development strategies. The Land Use Map (Figure LU-1) graphically identifies the planned land uses within Oceanside and the land use designations are described through policies. Areas within the community that require more focused planning efforts are also identified. Specific implementation programs for the various goals, objectives, and policies are identified in the Land Use Plan section of the element.

Related Plans and Programs

There are a number of related plans and programs that are considered in the formulation, adoption, and implementation of local land use policy. Related plans and programs are both local and regional in nature. Regional planning agencies, such as the San Diego Association of Governments (SANDAG), recognize that planning issues extend beyond the boundaries of individual cities. Efforts to address regional planning issues such as air quality, transportation, and habitat conservation have resulted in the adoption of regional plans. The form and distribution of development in Oceanside are affected by regional plans. Relevant local and regional plans related to the Land Use Element are discussed briefly in the following section.

Congestion Management Program

The San Diego region Congestion Management Plan was prepared by the San Diego Association of Governments as required by State law. The plan is updated on a regular basis. The Congestion Management Plan was developed as an integral complementary part of the region's overall growth management strategy, air quality improvement, and transportation development programs. The plan establishes a process to help ensure that a balanced transportation system is developed that better relates to population growth, traffic growth, and land use decisions to transportation and air quality improvement. The plan includes the setting of traffic level of service and transit performance standards, the development of both a trip reduction program and a land use impact analysis process, and the preparation of a seven-year capital improvement program.

Figure LU-1

Land Use Map

(Large scale hardcopy available at the Oceanside Planning Department)

San Diego Air Pollution Control District Regional Air Quality Strategy

The Regional Air Quality Strategy for the San Diego region includes a variety of measures to reduce traffic congestion and improve air quality. These include a variety of source pollution reduction programs, transportation control measures, and encouragement of cleaner fuels.

Local Coastal Program

The City has adopted a Local Coastal Program, which has been certified by the California Coastal Commission. This program outlines goals, policies, and programs to ensure appropriate development and land uses within the coastal area. The Land Use Plan section of the Local Coastal Program is included as General Plan Appendix B.

Oceanside Subarea Habitat Conservation Plan/Natural Communities Conservation Plan

Oceanside is in the process of adopting a Subarea Habitat Conservation Plan/Natural Communities Conservation Plan (Subarea Plan). The plan will comprehensively address how the City will conserve natural biotic communities and sensitive plant and wildlife species pursuant to the California Natural Community Conservation Planning (NCCP) Act of 1991 and the California and U.S. Endangered Species Acts. Approval and adoption of the plan by the City is intended to result in the issuance of federal and State authorizations for the take of certain listed rare, threatened, or endangered species. Once granted to Oceanside, the City will then be able to authorize the take of natural habitats or associated species, if consistent with the Subarea Plan. This will provide landowners with more regulatory certainty and aid in conserving the region's biodiversity.

Oceanside Redevelopment Plan

The City of Oceanside created a Redevelopment Project Area in 1975 in accordance with the California Community Redevelopment Law to eliminate blight within the designated redevelopment project area. The Redevelopment

Plan is one of the tools that the City uses to implement policies included in the Land Use Element. General Plan Appendix A contains the plan.

Comprehensive Land Use Plan Oceanside Municipal Airport

As the Airport Land Use Commission, SANDAG prepared the Comprehensive Land Use Plan for the Oceanside Municipal Airport based on aircraft produced noise and flight activities at the airport. The plan identifies appropriate land uses compatible with the noise and safety issues related to airport activities. The plan also identifies implementing mechanisms to address nonconforming uses within the noise contours and flight activity zones.

Oceanside Small Craft Harbor Precise Plan and Oceanside Harbor Design Standards

The Oceanside Small Craft Harbor Precise Plan provides planning policies to guide land and water development within the Oceanside Small Craft Harbor District, and serves as an integral component of the City's Local Coastal Program pursuant to the California Coastal Act. The Design Standards address signage within the Harbor District. The California Coastal Commission (CCC) required the Harbor District to prepare a Harbor Precise Plan to guide future developments in the Oceanside Harbor area as part of a permit requirement for the Oceanside Harbor Chart House restaurant in 1976. The plan was approved by the CCC in 1979 and was amended twice in 1998 to reflect land and water use changes and to clarify the plan. The Precise Plan and its Design Guidelines are intended to meet the Specific Plan requirement imposed by the Land Use Element.

El Corazon Master Plan

A master plan is being prepared for the 465-acre El Corazon property located in the middle of the City, at the intersection of Oceanside Blvd. and El Camino Real. The plan identifies land uses, development review process, general community design elements, and development standards for the property. The project will include recreational facilities, such as golf courses, visitor-serving facilities, and open space preserve.

Calle Montecito Neighborhood Revitalization Plan

This plan applies a comprehensive approach to understanding and dealing with the improvement needs of the Calle Montecito neighborhood. The Calle Montecito Neighborhood Revitalization Plan identifies a wide range of issues as well as inherent community strengths and opportunities. Based on community input, revitalization goals and work initiatives were generated and combined in the Libby Lake 2000 plan to create an overall plan that provides a timeframe, assignment of responsibilities, and identifies funding resources.

Mission Avenue Corridor Strategy Plan

The Mission Avenue Corridor Strategy Plan addresses the need to revitalize the Mission Avenue Corridor from Interstate 5 on the west to Mission San Luis Rey on the East. The plan outlines the overall goals to guide revitalization of the corridor and presents a snapshot of key issues related to living and working along the corridor. It also provides both corridor-wide and segment-specific actions and an implementation program for the prioritized actions.

Mission San Luis Rey Historic Area Development Program and Design Guidelines

Recognizing the importance of maintaining and enhancing the area around Mission San Luis Rey, the report addresses the long-range goals and objectives for the area and establishes a program with specific guidelines for detailed proposal review. Sketches and exhibits are included to illustrate overall design concepts and their applications in specific conditions. The document is intended to provide a flexible design framework that will respect and compliment the Mission's historic setting, as well as encourage high quality, new development in the San Luis Rey area of the City.

Specific Plan for the San Luis Rey River Flood Control Project

This Specific Plan is intended to serve as an overlay and refinement to the City's General Plan. The plan contains policies that would prohibit development in flood prone and environmentally sensitive areas. The plan is designed to provide protection to both life and property within the 7.2-mile reach targeted by the project.

San Luis Rey River Specific Plan

The Specific Plan addresses development for the San Luis Rey River and vicinity in the downtown, coastal area. The San Luis Rey River and the surrounding vacant parcels are the last major portions of undeveloped land in Oceanside's Coastal Zone. The plan is intended to provide a comprehensive land use plan for the area which will: a) become an adjunct and refinement to the City's General Plan, intended to coordinate planning activities of the governmental agencies; b) serve as a certificable component of Oceanside's

Local Coastal Program; and c) provide management policies and development criteria to guide future actions in the river area. Since the river is a significant coastal resource in terms of its recreational, scenic, and wildlife values, the San Luis Rey River Specific Plan includes measures to address the conservation and wise use of these resources.

The Sterling Property Specific Plan

The area subject to this specific plan contained substandard military housing. In exchange for constructing new military housing on MCB Camp Pendleton, a developer was chosen to receive the Sterling Homes property for redevelopment. The Sterling Property Specific Plan was prepared to define the basic development parameters for the Sterling Homes site including the land use mix and density; the primary circulation pattern; the overall open space concept and open space requirements; and the location and capacity of utilities to be provided by the developer.

State Route 78 Urban Design Study

The Urban Design Study is a follow-on to the 1987 State Route 78 Reconnaissance Study and Concept Plan which examined land use and transportation issues for the corridor. The Urban Design Study focuses on the visual experience of the freeway traveler on the SR-78 freeway between the Interstate 5 intersection to the west and the North Broadway intersection to the east in Escondido. The study provides the means to preserve or enhance the visual quality that encompasses the freeway corridor, including landscape concepts, urban design plan, and design guidelines for the properties adjacent to the SR-78 right-of-way.

Oceanside Zoning Ordinance

The City's Zoning Ordinance is the primary implementation tool for the Land Use Element. Together, the Zoning Ordinance and Zoning Map identify specific types of land use, intensity of land use, and development and performance standards applicable to specific areas and parcels of land within the City.

Development Guidelines for Hillsides

The City's Development Guidelines provide an illustrated manual to assist developers, landowners, and City officials in understanding and interpreting the City's policies and regulations for hillsides. The guidelines balance the desire to preserve the natural beauty of the hills with the need to provide for future development that incorporates concerns for public health and safety to achieve reasonable land use in the hillsides.

Grading Regulation Manual

This code sets forth rules and regulations to control excavation, grading, and earthwork construction, including fills and embankments, and establishes administrative requirements for issuance of permits and approval of plans and inspection of grading construction.

Engineers Design and Processing Manual

The purpose of the Engineers Design and Processing Manual is to establish the procedures and minimum standards for the various plans and documents submitted to and processed by the City. The standards presented in the manual govern the processing of subdivision maps and related documents as well as public and private improvement and grading plans. The City also uses the manual as a standard for reviewing tentative maps, development plans, and other related applications.

Rancho Del Oro Specific Plan

The Rancho Del Oro Specific Plan encompasses approximately 1,940 acres of land within the geographic center of the City. The plan was prepared to provide for the development of a high quality, comprehensive planned community. The mixed land use plan provides for the phased development of the property with industrial and commercial uses as well as a variety of residential housing opportunities, and includes provisions for implementing circulation system and public utility improvements.

Del Oro Hills Specific Plan and Planned Residential Development Master Plan

The Del Oro Hills Specific Plan area includes 300 acres in the south-central area of the City. The Plan identifies land uses for the property, including land use descriptions and standards for the various land uses. Development standards and guidelines are also included for other features of the plan including the circulation system, architectural design, and open space.

Relationship to Other General Plan Elements

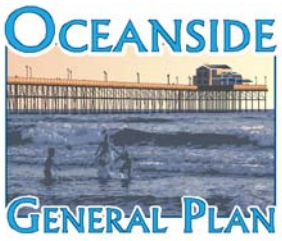
The Land Use Element is a distinct element, which, together with the other General Plan elements, comprises the General Plan. All elements of the General Plan are interrelated to a degree, and certain goals and policies of each element may also address issues that are the primary subjects of other elements. The integration of overlapping issues throughout the General Plan elements provides a strong basis for implementation of plans and programs, and achievement of community goals.

The Land Use Element relates very closely to all of the other General Plan elements. This element establishes the planned land use pattern for Oceanside. Alternatively, the other General Plan elements ensure that infrastructure and community facilities are available to accommodate planned land uses, and that the public's safety and the unique qualities of Oceanside are safeguarded and enhanced.

For example, the Housing Element of the General Plan provides the basis for establishing housing stock that meets the affordability requirements and other special needs of the community. The Circulation Element provides a

Master Transportation Plan to accommodate increased traffic from planned development. The use of alternative transportation modes and reduction of automobile trips are also addressed in the Circulation Element, and its sub-element, the Recreational Trails Element, to meet the transportation demand from new development, and to mitigate the impact of development on regional air quality and traffic conditions. A number of areas are designated for parks and open space uses on the Land Use Map for recreational, aesthetic, and environmental preservation purposes. The Environmental Resources Management and Community Facilities Elements include policy and plans to maintain, enhance, and protect existing park and open space areas and to develop new facilities to meet new demand from population growth.

The Public Safety, Noise, and Hazardous Waste Management Elements ensure that planned land uses identified in the Land Use Element are compatible and will not result in public safety hazards or exposure of people to excessive noise or hazardous materials. In addition, the Military Reservation Element recognizes that the operation of Camp Pendleton affects the land uses within Oceanside.



LONG-RANGE POLICY DIRECTION

I. COMMUNITY ENHANCEMENT

GOAL: The consistent, significant, long term preservation and improvement of the environment, values, aesthetics, character and image of Oceanside as a safe, attractive, desirable and well-balanced community.

Policy:

A. The goals, objectives, and policies of the City of Oceanside's General Plan shall direct the City in determining the location, type, and timing of improvements within the City.

1.0 Implementation of the Land Use Element

1.01 General Plan Consistency

OBJECTIVE: To ensure all projects are consistent with the General Plan.

Policy:

A. Tentative Maps, Development Plans, and Conditional Use Permits approved prior to the adoption of this Element and exercised thereafter without modification, revision, amendment, or extension shall be considered consistent with this Element.

1.02 General Plan Revision

OBJECTIVE: To assure a proper and annual review of the Oceanside General Plan.

Policy:

A. The Planning Department shall, before the end of each fiscal year prepare a "General Plan Annual Report" summarizing the City's performance in meeting the goals and objectives within the General Plan, and suggest possible refinements of the General Plan.

1.1 Community Values

OBJECTIVE: To ensure the enhancement of long term community and neighborhood values through effective land use planning.

Policies:

A. Land uses shall be attractively planned and benefit the community.

B. Land uses shall not significantly distract from nor negatively impact surrounding conforming land uses.

C. The City shall analyze the long-term effects of all proposed development to assure both the present and future social, economic, and physical enhancement of the community.

D. The City shall support and encourage the fulfillment of widespread neighborhood and community values.

E. The development of storage tanks, distribution terminals, emission control systems, pumping stations, service yards, transportation facilities, pipelines, or any other facilities supporting off-shore oil and gas drilling operations shall be prohibited.

1.11 Balanced Land Use

OBJECTIVE: To develop and use lands for the long-term provision of a balanced, self-sufficient, and efficient community.

Policies:

A. The City shall establish and enforce a balanced distribution of land uses to organize the City in a hierarchy of activity centers and land use so as to foster a sense of neighborhood, community, and regional identity.

B. The City shall analyze proposed land uses for assurance that the land use will contribute to the proper balance of land uses within the community or provide a significant benefit to the community.

C. The City shall continuously monitor the impact and intensity of land use and land use distribution to ensure that the City's circulation system is not overburdened beyond design capacity.

1.12 Land Use Compatibility

OBJECTIVE: To minimize conflicts with adjacent or related land uses.

Policies:

A. Adequate setbacks, buffering, and/or innovative site design shall be required for land uses that are contiguous to and incompatible with existing land uses

B. The use of land shall not create negative visual impacts to surrounding land uses.

C. The use of land shall not subject people to potential sources of objectionable noise, light, odors, and other emissions nor to exposure of toxic, radioactive, or other dangerous materials.

1.121 Land Use Compatibility with Adjacent Jurisdictions or Responsible Agencies

OBJECTIVE: To assure appropriate land use compatibility is maintained between Oceanside and adjacent jurisdictions or responsible agencies.

Policies:

A. Oceanside shall formally notice adjacent jurisdictions of proposed land uses or developments that may affect an adjacent jurisdiction.

B. Oceanside shall formally notice responsible agencies of proposed land uses or developments that may affect an agency's program or responsibilities.

C To provide for proper land development or land use compatibility the City shall, wherever possible, take appropriate action on proposed land uses or development to address the concerns of adjacent jurisdictions or responsible agencies.

D. The City shall formally reply to an adjacent jurisdiction's notice of proposed land development or land use to assure responsible and appropriate land use and infrastructure compatibility is maintained.

1.13 Neighborhood Character

OBJECTIVE: To promote and reinforce the unique and positive attributes of individual neighborhoods of Oceanside while strengthening citywide goals, involvement, and identity.



Policies:

A The area between Ivy Road and Vista Way and between Jefferson Street and El Camino Real, shall address the specific

development standards and requirements for subdivision and development of land to create single family residential developments fronting and taking access on Ivy Road and professional and office developments fronting and taking coordinated access on Vista Way.

B. The area which includes the Fire Mountain single family residential district shall ensure that the rustic and rural nature of the district is preserved and enhanced. A key to this objective is providing for:

   1) minimum lot sizes of 10,000 square feet or greater,
   2) view preservation, and
   3) extensive landscaping.

C. The area surrounding Mesa Drive east of El Camino Real shall ensure and define a buffer between the existing residential area on the north side of Mesa Drive and the industrial area to the south.

D. An open space buffer of appropriate width shall be required to separate residential developments from industrial developments on the south side of Oceanside Boulevard.

E. All existing property and future subdivided lots taking access on Stallion Drive shall be determined to be located within the Estate A (0.5 - 0.9 du/ac) Residential Land Use Designation.

F. The property containing approximately fifty and one-half (50.5) acres located directly west of the intersection of El Camino Real and Vista Oceana shall be developed in a manner that minimizes adverse impacts to the surrounding residential areas. To this end, the following restrictions shall be applied to future subdivisions and/or developments of the property:

   1) Dwelling unit types shall be limited to single family detached homes, either Single Unit Conventional or Single Unit-Variable as defined in Section 2.34 of this Element.

2) The maximum number of dwelling units shall not exceed one hundred seventy (170) units.

3) Large open space areas shall be maintained along the perimeter of the property.

G. The area bounded by Horne Street, Weitzel Street, Center Avenue, Michigan Street, Freeman Street, and Missouri Street (otherwise referred to as the 300 block of Townsite Central) shall be limited to maximum allowable units on the typical 5,000 square foot lot to three (3) units. Also, developments shall be limited to a triplex design in nature to ensure compatibility with the surrounding neighborhood.

H. For lands within the Loma Alta, Fire Mountain, and South Oceanside Neighborhood Planning Areas that are designated Estate B (1 - 3.5 dwelling unit/acre) and with the corresponding zoning of RE-B, a minimum lot size of 10,000 square feet as defined in the Zoning Ordinance shall be considered consistent with the underlying Land Use designation of Estate B Residential.[1]

1.14 Noise Control

OBJECTIVE: To improve the quality of Oceanside's environment by minimizing the negative effects of excessive noise levels.

Policies:

A. Noise emissions shall not reach levels that pose a danger to the public health.

B. Noise emissions shall be controlled at the source where possible.

[1] Addendum to Land Use Element Text, GPA-11-88 City Council Resolution No. 88-273 (12/7/88)

C. Noise emissions shall be intercepted by barriers or dissipated by space where the source cannot be controlled.

D. Noise emissions shall be reduced from structures by the use of soundproofing where other controls fail or are impractical.

E. Acceptable noise levels shall be demonstrated by the applicant in the review and approval of any projects or public or private activities that require a permit or other approval from the City.

F. Greater than normal open space separation may be required between residential developments and secondary arterials or higher rated roadways, railroad right-of-way, and other noise or nuisance-producing land uses. This may be accomplished by either vertical and/or horizontal open space separation. The separation should be enhanced by decorative walling and extensive landscaping.

G. Any proposed changes to the Land Use and Circulation Elements of the General Plan shall require review and consideration of the potential impacts on noise levels.

1.15 Public Safety

OBJECTIVE: To ensure an acceptable level of public safety for the prevention and reduction of loss of life and personal property of the citizens and visitors of Oceanside.

Policies:

A. The City shall continually evaluate the acceptable level of risk to the public health, safety, and general welfare, and adjust policies accordingly.

B. The City shall provide available information, and encourage education of seismic, geologic, fire, flooding, and other hazards.

1.151 Risk Sensitivity of Land Use

Policy:

A. The City shall consider the type of land use in determining acceptable levels of risk from seismic and geologic hazards. The Public Safety Element shall serve as a guide for this determination.

1.152 Seismic and Geologic Hazards

Policies:

A. The City shall consider seismic and geologic hazards when making land use decisions, particularly in regards to risk sensitive land uses as defined in the Public Safety Element.

B. High risk land uses, as defined in the Public Safety Element, should be prohibited from areas of high seismic or geologic hazard.

C. The City shall regulate land uses within areas highly susceptible to seismic and geologic hazards.

D. The City shall require expanded soils and geologic testing and necessary engineering precautions when deemed necessary to reduce risks to acceptable levels. Wave action, erosion, and geotechnical reports shall be required as determined necessary.

1.153 Fire Hazards

Policies:

A. The City shall maintain the necessary equipment, personnel, and water supply levels to provide a class 4 or better insurance rating to the entire City.

B. Places of public assembly shall be designed with adequate, well-marked emergency exits, and have public address systems which would not be rendered inoperable because of fire.

1.154 Landfill Safety

Policy:

A. Any proposed structure adjacent to or surrounding a previous landfill site must be investigated by the applicant to determine whether protection from landfill gas or geotechnical instability is needed.

1.16 Housing

OBJECTIVE: To ensure that decent, safe and sanitary housing is available to all current and future residents of the community at a cost that is within the reach of the diverse economic segments of Oceanside.

Policies:

A. The City shall strive to maintain a reasonable balance between rental and ownership housing opportunities, between senior and family housing, and encourage a variety of individual choices of tenure, type, and location of housing throughout Oceanside.

B. The City shall strive to produce opportunities for decent and affordable housing in a pleasant environment for all of Oceanside's citizens.

C. The City shall ensure that housing is developed in areas with adequate access to employment opportunities, community facilities, and public services.

D. The City shall encourage development of a variety of housing opportunities, with special emphasis on providing:

1) A broad range of housing types, with varied levels of amenities and number of bedrooms;

2) Sufficient rental stock for all segments of the community, including families with children; and

3) Housing which meets the special needs of the elderly and the handicapped.

E. The City shall protect, encourage, and where feasible, provide housing opportunities for persons of low and moderate income.

1.17 Public Facilities Management

OBJECTIVE: To provide a consistent and high level quality of public services and facilities to the residents of the City.

Policies:

A. Residential, commercial, and industrial development throughout the City shall be coordinated to ensure that adequate public services and facilities are provided to serve future development.

B. Land use and development review applications that are inconsistent with the capability of any public service agencies to provide cost-effective services shall not be approved.

C. Major extensions of services or utilities to facilitate land use change shall not be approved without a thorough review of all social, economic, and environmental factors and appropriate mitigation measures implemented, if necessary.

D. Compact and in-fill development should be encouraged to concentrate expenditures for public services.

1.2 Site Design

OBJECTIVE: To provide high-quality site design, all proposed land development projects shall take advantage of natural or manmade environments to maximize energy conservation, natural air circulation, public safety, visual aesthetics, private and common open spaces, privacy, and land use compatibility.

Policies:

A. The placement of all proposed structural components, landscaping, accessways, etc. shall be oriented on the site in such a manner to maximize:

1) Interior building absorption and retention of solar energy during appropriate seasons and times of day, and the access to sunlight for potential solar energy collection; and

2) The even circulation of natural breezes between and through all buildings; and

3) The quality of view and vistas from the site to the surrounding environment; and

4) The quality of views and vistas of the site from surrounding land uses; and

5) The public safety by eliminating designs that may harbor or hide detrimental activities.

B. A combination of deep, landscaped setback areas, berms, and decorative sound attenuation walls shall be required where developments abut major or intense transportation corridors.

C. New development or land uses shall provide coordinated site design wherever possible with existing or proposed adjacent land uses to provide complimentary site design, unified circulation access, and joint use of ancillary facilities.

D. Street hardware including but not limited to:

- mailboxes or multiple box units (MBU's)
- bus shelters, bike racks, benches, etc.
- fire hydrants
- utility poles and boxes

- street lighting
- parking meters
- road signage
- and other ancillary facilities

shall not detract, but shall enhance, the streetscape and adjoining land uses and community.

E. The City shall encourage the use of multiple mailbox units in attractive landscaped settings.

F. The City shall encourage plans that maximize convenient, safe, and efficient design features for future residents of the project.

G. All developments shall design parking areas to maximize efficiency, safety, convenience, and open space.

1.21 Common Open Space

OBJECTIVE: To provide and maintain common open areas for a wide range of uses.

Policies:

A. Common open space must be accessible and usable by potential users of the common open space.

B. Common open spaces within a project site shall be contiguous, unless it is found that segregation of the area and type of open space uses better serve the purposes of the General Plan and the project site.

C. Where feasible, common open space shall be integrated with adjacent common or public open spaces, trails, or bicycle transit systems to promote an open space or trails network throughout the City.

1.22 Landscaping

OBJECTIVE: The enhancement of community and neighborhood identity through landscaping requirements that frame and soften the built environment consistent with water and energy conservation.

Policies:

A. Existing mature trees shall be retained wherever possible.

B. Mature trees removed for development shall be mitigated by replacement with an appropriate type, size, and number of trees.

C. Drought-tolerant materials, including native California plant species, shall be encouraged as a landscape type.

D. The City shall preserve, enhance, and perpetuate the positive historic landscapes of Oceanside as identified in the City's "Comprehensive Historic and Architectural Resources Survey".

E. The City shall encourage the inclusion of green belts and common open space for pedestrian use in residential developments.

F. A buffer of landscaping shall be required between the built environment and lands left in a natural or open state. The landscape buffer shall be of sufficient size and shall use plant materials that will retard the spread of wild fire.

1.23 Architecture

OBJECTIVE: The architectural quality of all proposed projects shall enhance neighborhood and community values and City image.

Policies:

A. Architectural form, treatments, and materials shall serve to significantly improve on the visual image of the surrounding neighborhood.

B. Structures shall work in harmony with landscaping and adjacent urban and/or topographic form to create an attractive line, dimension, scale, and/or pattern.

C. Elevations, floor plans, perspectives, lines-of-sight, material boards, and other such displays and exhibits shall be provided as necessary to ensure compliance with General Plan policies.

1.24 Topographic Resources

OBJECTIVE: To ensure that development preserves and enhances the unique beauty and character of the City's natural topographic features and does not contribute to slope instability, flooding, or erosion hazards to life and property.

Policies:

A. Lands designated for industrial and commercial development may require significant alteration of the terrain to ensure their viability. Therefore, it is recognized that the ability of such projects to fulfill the policies contained below will be limited.

B. Lands considered to possess significant natural topographical features shall be preserved and integrated into project designs. Such lands include natural slopes of twenty percent (20%) or more with a minimum elevation differential of fifty (50) feet; major canyons and/or watercourses; significant rock outcroppings, trees, and native vegetation.

C. Grading permits shall not be issued until all appropriate discretionary actions by the City and other responsible agencies approving the development have been granted.

D. The term "natural slope" shall also apply to any man-made or altered slope which, over a period of years, revegetation and/or erosion has made indistinguishable from the natural terrain.

E Structures shall be designed to adapt to hillside conditions.

F Excessive cut and fill grading to create standard prepared pads shall be prohibited.

G. Where grading is required, flat planes, and sharp angles of intersection with the natural terrain shall be avoided.

H. Slopes shall be rounded and contoured to blend with the existing topography, unless on an individual site this practice would diminish open space or significant natural features of the site.

I. The structural quality of the soil and geologic conditions shall be incorporated into the site design and determine the method and type of construction. Slope stability shall be ensured during and after construction.

J. Potential hazards of flooding, erosion and sedimentation shall be reduced by designing the site drainage system to accommodate the existing upstream storm runoff and to coordinate with existing downstream conditions.

K. Vehicular access to intermittent and perennial streams shall be controlled through project design.

L. Setbacks from stream banks shall be established in the project design to maintain the health and usefulness of the watercourse for the benefit of the public.

M. The amount of impervious surfacing shall be limited and shall be designed to support the natural drainage system.

N. Roadways shall be designed and located to avoid excessive cut and fill, surface disturbance and to respect the existing topography.

O. Parking areas shall adapt to the topographic character of the site.

P. Site disturbance shall be limited to the minimum area necessary as construction proceeds.

Q. Groundcover shall be re-established as early as possible as construction proceeds.

R. Topsoil from excavated areas shall be stockpiled for reuse on the site where appropriate.

S. The clustering of residential units to preserve natural topographic features shall be encouraged provided:

1) It has been clearly and distinctly demonstrated that the residential cluster provides the most appropriate design to ensure preservation of the topographic resources.

2) The net density (excluding common open spaces) of each residential cluster does not exceed the maximum potential density permitted within the land use designation.

3) The dwelling units of the residential cluster are consistent with the land use designation.

4) The common open areas are well integrated within the boundaries of the residential cluster and provide equitable access to all residents.

5) Residential clusters are confined to relatively small areas and separated by inter-linking open space areas to provide visual and spatial relief from continuous urban development.

1.25 Undevelopable Lands

OBJECTIVE: To enhance the community welfare and increase public safety through:

1) preservation of significant natural resources, or
2) the provision of adequate building setbacks from natural hazards.

OBJECTIVE: To ensure that the proposed development on the developable area of a site is compatible with surrounding developments within the same land use designation.

Policies:

A. Lands considered undevelopable shall be unbuildable and shall not be included in density calculations that define the development potential on a site. Undevelopable lands include slopes in excess of forty percent (40%) with a minimum elevation differential of twenty-five (25) feet and riparian corridors or associated vegetated areas of:

1) rivers,
2) intermittent or perennial streams, or
3) lakes

As a minimum, riparian corridors shall include channelways and banks.

B. Since land use patterns and developments are long-term features, lands on which significant natural hazards are likely to occur within the economic life of the proposed use shall be evaluated for their developability. The City may require studies, mitigation measures, and/or hazard setbacks to fulfill this policy.

C. The following criteria governs the applicability of *1.25 Undevelopable Lands*:

1) The method of determining the developable portion of a project site shall apply to all applications requiring discretionary action, including Specific Plans, Tentative Maps, Development Plans, Conditional Use Permits, Variances and Coastal Development Permits and to areas requesting a grading permit outside the discretionary process.

2) All approved and legally valid Tentative and Final Maps, Tentative Parcel Maps, Development Plans, Conditional Use Permits and Variances, and existing recorded residential lots shall not be subject to the provisions of this policy.

3) Specific Plans approved prior to the existence of this policy are not exempted. All previously approved discretionary projects that are eligible and under review for a time extension, revision, or amendment are subject to the provisions of this policy.

4) Modification of serious erosion gullies in excess of forty percent (40%) slope, which in the City Engineer's opinion must be altered in order to remedy unsafe and unstable conditions, shall be allowed. If as a result of this work the area of the erosion gullies is modified to slopes less than forty percent (40%) this area may be used in the calculation of the development potential of land at the discretion of the Planning Commission or City Council.

5) For the purposes of determining riparian areas, all such areas including artificially created agricultural lakes, water retention basins, and ponds shall be considered undevelopable for density calculation purposes. The City shall consult with all appropriate agencies through the environmental review process for assistance in the determination of riparian habitat areas.

6) As a basic information requirement for projects in hillside areas, an accurate and recent topographical map with minimum five (5) foot contour lines shall be submitted by the applicant at a scale of at least one inch equaling two hundred feet (1" = 200'). Such a map shall clearly depict areas between twenty percent (20%) and forty percent (40%) slope and areas with slopes over forty percent (40%). Any other information as required by the City's Hillside Ordinance shall also be submitted with a project's application.

7) Parcels of land which become virtually undevelopable as a result of applying these development potential policies may, at the discretion of the Planning Commission or City Council as applicable, be granted an exception to the strict adherence of these policies through one of the following methods:

   (a) A limited transfer of development rights to an adjacent and/or a suitable area provided that it can be found that the "host" area can adequately absorb all of the impacts associated with that transfer and the overall high density range of the host area is not exceeded.

   (b) An exception from, or a modification to the specific requirements of these policies may be granted upon a finding that (1) such exception or modification fulfills the overall objective, purpose, and intent of these policies, and (2) the exception or modification demonstrates a superior and more compatible relationship to pre-existing surrounding uses, as well as to land use categories.

1.3. Special Management Areas

OBJECTIVE: To provide special management of sensitive historical, cultural, recreational, and environmental areas and areas with unique planning considerations within the City.

1.31 Airport Influence Area

OBJECTIVE: To maintain and enhance the current and future operations of the Oceanside Municipal Airport, Oceanside desires to pursue the airport's growth as a modern general aviation facility as defined by the Federal Aviation Agency (FAA) Guidelines with the potential for short haul service. Airport growth should occur in a manner which maximizes airport and general public safety by ensuring that surrounding land uses are compatible with airport operations.

Policies:

A. The City shall protect the airport for corporate and recreational aviation and shall not permit its use to support offshore oil and gas drilling facilities.

B. The airport overlay encompasses the entire airport influence area as defined by the Comprehensive Land Use Plan (CLUP) adopted by SANDAG in 1981 and depicted on the General Plan Land Use map (see Figure LU-2).

C The data, methodology, guidelines, policies, and plan recommendations of the CLUP are fully a part of the airport overlay.

D. The establishment of flight activity zones (or clear zones) at the end of runways, height limitations in approach departure corridors, and the appropriate regulations of land use shall be guided by the findings and recommendations of the CLUP.

E. The City shall encourage the development of land uses within the airport overlay that are compatible with general aviation operations.

F. The City shall ensure that flight activity zones (clear zones) are maintained in association with the airport runway.

G Where existing or potential land uses are found to be incompatible with airport operations, the City shall establish, where practical, an equitable "off-setting" benefits package for uses which should be modified or phased out completely.

H. The City shall promote a positive image of the airport and the community as a whole through preparation of development standards that stress quality building and landscape design features.

Figure LU-2
Special Management Area
Airport Influence Area
(Hardcopy available at the Oceanside Planning Department)

I. The City shall ensure compliance with California noise standards for both existing and planned future residential uses within the airport overlay. The following shall be adhered to:

1) Compliance with operative City codes and California noise standards if remodeling, conversions, or additions are made which require a building permit.

2) Proposed residential development should be designed and located in such a fashion that natural topography, screening techniques, building setbacks, floor plan arrangements, and other relevant factors have all been utilized to the greatest extent possible in order to minimize noise impacts.

3) Proposed residential development shall not be approved unless appropriate aviation easements are granted as a condition of approval.

J. In recognition of the fact that residential and other airport sensitive uses proposed outside of the airport overlay area may be impacted by airport operations, the City shall require the granting of appropriate aviation easements as a condition of approval for projects in the general area bounded on the north by Camp Pendleton, on the east by E1 Camino Real, on the south by Mission Avenue, and on the west by the Oceanside Harbor.

K. In recognition of several planned major public facility projects which are within the airport overlay and will provide benefits to the airport as well as the entire City, the City shall ensure that land use decisions and proposed regulations do not preclude or hinder the timely and cost effective completion of these vital public facility projects.

1.32 Coastal Zone

OBJECTIVE: To provide for the conservation of the City's coastal resources and fulfill the requirements of the California Coastal Act of 1976.

Policy:

A. The City shall utilize the certified Local Coastal Plan and supporting documentation for review of all proposed projects within the Coastal Zone (see Figure LU-3). Specifically, the goals and policies of the Local Coastal Program Land Use Plan (see General Plan Appendix B) shall be the guiding policy review document.

Figure LU-3
Coastal Zone
Local Coastal Program (LCP) Program
(Hardcopy available at the Oceanside Planning Department)

1.321 San Luis Rey River Specific Plan

OBJECTIVE: To provide a comprehensive land use plan for the coastal portion of the San Luis Rey River which will:

A. Become an adjunct and refinement to the City's General Plan, intended to coordinate planning activities of the City, Redevelopment Agency, private landowners, and various governmental agencies;

B. Serve as a certifiable component of Oceanside's Local Coastal Program; and

C. Provide management policies and development criteria to guide future actions in the coastal portion of the river area.

(See Figure LU-4)

1.3211 Access and Recreation and Visitor Serving Facilities

Policy:

The City shall maximize public access in the coastal portion of the San Luis Rey River and environs consistent with natural resource values.

1.3212 Sensitive Habitats

Policy:

The City shall protect, maintain, and enhance existing sensitive habitats.

1.3213 Water Quality

Policy:

The City shall maintain, enhance, and where feasible, restore water resources.

1.3214 New Development, Design Criteria, and Performance Criteria

Policy:

New development shall be sited and planned in a manner that utilizes the locality of the San Luis Rey River to the fullest, but retains the aesthetic and resource values present.

Figure LU-4
Special Management Area
Coastal Zone San Luis Rey River Specific Plan Boundary Map
(Hardcopy available at the Oceanside Planning Department)

1.3215 Hazards

Policy:

The City shall protect the public safety and welfare in areas of natural flood or geologic hazards.

1.3216 Implementation of the San Luis Rey River Specific Plan

Policies:

A. The City shall require all private developments in the San Luis Rey River Specific Plan study area to submit a Development Plan for City approval, unless a Conditional Use Permit is already required.

B. The City shall develop a phasing and funding program. These programs would establish:

1) The priority and sequence of proposed acquisitions and public developments.

2) Proposed funding sources for public improvements (e.g., grant funds, other agency funds, developer contributions, or City funds).

3) Cost estimates for specific improvements, to enable capital facilities budgeting.

C. The City shall establish the development of a monitoring and maintenance program to periodically:

1) Review the condition of the San Luis Rey River and assure the correct implementation of the San Luis Rey River Specific Plan; and

2) Review Specific Plan adequacy in light of changing conditions and needs.

1.322 Harbor District

Policies:

A. The adopted Oceanside Small Craft Harbor Precise Plan and Oceanside Harbor Design standards shall guide development and land use within the Harbor District (see Figure LU-5).

B. The City shall not support the use of the Camp Del Mar Basin for facilities supporting offshore oil and gas drilling operations.

1.323 Coast Highway Development Incentive District

Policies:

A. The Coast Highway Vision and Strategic Plan (CHVSP) shall provide policy direction for the revitalization of the Coast Highway corridor. The CHVSP shall guide both capital improvements and zoning incentives meant to revitalize and enhance the Coast Highway corridor by calming traffic, increasing walkability, improving visual quality, and facilitating a synergistic mix of commercial, residential, and public land uses.

B. The Coast Highway Development Incentive District shall serve as an optional bundle of land use and development regulations that provide for additional residential density and building height in exchange for specified public benefits, standalone residential projects within certain segments of the corridor, and streamlined entitlement review in conjunction with form-based zoning standards. Applicants may choose to have a project reviewed under either the Coast Highway Development Incentive District or the underlying zoning regulations. Projects proposed within the Overlay must comply with all other applicable regulations.

C. In exchange for specific public benefits, densities between 43 and 63 dwelling units per acre shall be permitted in mixed-use

development in nodal segments of the Coast Highway corridor, as depicted on map exhibits in the Coast Highway Development Incentive District.

Figure LU-5
Special Management Area
Oceanside Small Craft Harbor Precise Plan
(Hardcopy available at the Oceanside Planning Department)

1.33 Historic Areas and Sites

Policy:

A. The City shall utilize adopted criteria, such as the "Mission San Luis Rey Historic Area Development Program and Design Guidelines," to preserve and further enhance designated historic or cultural resources (see Figure LU-6).

1.34 Specific Plan for the San Luis Rey River Flood Control District

OBJECTIVE: To implement, in a timely manner, the San Luis Rey River Specific Plan flood control project for the purpose of the protection of life and property from flood damage, preserving environmental quality and promoting the economic well-being of the community.

Policies:

A. Prohibit new construction within the flood channel, ponding areas and mitigation areas shown on Figures LU-7 and LU-8, and limit construction in the flood overflow and development precluded areas to flood compatible uses.

B. As part of the City's discretionary review process, require all new developments in and adjacent to the river channel to grant land in fee title and construct improvements in accordance with the Corps of Engineers' Flood Control Plan.

C. Work closely with the Corps of Engineers during the advance engineering and design phase to minimize project costs wherever feasible and consistent with engineering design and environmental criteria.

1.35 Redevelopment Project Area

OBJECTIVE: To promote the long-term viability and rejuvenation of the redevelopment area consistent with the overall policies and improvements of the City.

Policy:

A. The Downtown Redevelopment Project Area (see Figure LU-9) shall be implemented by the Redevelopment Plan. This plan shall be implemented by the Oceanside Community Development Commission, consistent with City policy and the General Plan.

Figure LU-6
Special Management Area
Historic Areas and Sites
(Hardcopy available at the Oceanside Planning Department)

Figure LU-7
Special Management Area
Specific Plan for the San Luis Rey River Flood Control Project
Part I
(Hardcopy available at the Oceanside Planning Department)

Figure LU-8
Special Management Area
Specific Plan for the San Luis Rey River Flood Control Project
Part II
(Hardcopy available at the Oceanside Planning Department)

Figure LU-9
Special Management Area
Redevelopment Project Area
(Hardcopy available at the Oceanside Planning Department)

1.36 Specific Plan/Residential Density Transfer

Specific plans serve as the land development guidance system for certain areas within the City.

Certain specific plans within the City contain areas of residential land use designations that do not fit within the City's residential density ranges.

In these specific plans, residential densities are transferred from one location to another within the boundaries of the specific plan.

The City has three specific plans with such residential density transfer mechanisms. They are:

1.361 Rancho Del Oro

1. Rancho Del Oro Specific Plan and Development Agreement: File number S-1-84, adopted by Resolution No. 85-238 (see Figure LU-10, LU-11, LU-12).

1.362 Del Oro Hills

2. Del Oro Hills Specific Plan and Planned Residential Development Master Plan: File number S-2-84, adopted by Resolution 85-14 (see Figure LU-13).

1.363 The Sterling Property

3. The Sterling Property Specific Plan: File number S-3-84, adopted by Resolution 86-03 (see Figure LU-14).

A careful examination of these adopted specific plans is necessary to clarify the exact amount and type of land uses planned for various areas within the specific plan boundary.

1.37 Guajome Regional Park Sphere of Influence

OBJECTIVE: To protect the valuable natural and cultural resources of Guajome Regional Park by insuring that future development in areas adjacent to or visible from Guajome Regional Park will be compatible with its recreation and scenic areas.

Policies:

A. The City shall recognize the sphere of influence boundary line established by the Cities of Oceanside and Vista, the Board of Supervisors of San Diego County and the Guajome Regional Park Area Planning and Coordinating Committee (see Figure LU-15).

Figure LU-10
Special Management Area
Rancho del Oro Specific Plan
(Hardcopy available at the Oceanside Planning Department)

Figure LU-11
Rancho del Oro
Existing General Plan
(Hardcopy available at the Oceanside Planning Department)

Figure LU-12
Rancho del Oro
Density Management Plan
(Hardcopy available at the Oceanside Planning Department)

Figure LU-13
Special Management Area
Del Oro Hills Specific Plan
(Hardcopy available at the Oceanside Planning Department)

Figure LU-14
Special Management Area
Sterling Specific Plan
(Hardcopy available at the Oceanside Planning Department)

Figure LU-15
Special Management Area
Guajome Regional Park
(Hardcopy available at the Oceanside Planning Department)

B. The City shall solicit the Guajome Regional Park Area Planning and Coordinating Committee for comments and recommendations on proposed projects within the Guajome Regional Park Sphere of Influence during the development review process.

C. Proposed projects within the Guajome Regional Park Sphere of Influence shall be subject to the following objectives and policies:

OBJECTIVE: To ensure that structures shall be visually compatible with the open space nature of Guajome Regional Park.

Policies:

D. Building exteriors shall have textured surfaces and extensive use of natural building materials for accents and treatments.

E. The colors of exterior surfaces of structures shall be tones compatible with the surrounding landscape and not bright, glossy, or otherwise visually out of character with the natural setting.

F. Structures shall not be permitted on slopes abutting Guajome Regional Park.

G. Deep landscaped setbacks shall be maintained on yards abutting Guajome Regional Park and those abutting rights of way which border the park.

H. Structures shall be oriented to preserve views from Guajome Regional Park, the development, and surrounding properties.

OBJECTIVE: To ensure that property altered by development remains compatible with the environment of Guajome Regional Park.

Policies:

I. Cut slopes visible from Guajome Regional Park shall be revegetated with a mixture of drought-tolerant and native plant species.

J. Properties abutting Guajome Regional Park shall provide a transition area between landscaped areas and natural vegetation.

K. Vegetation clearance shall only be conducted immediately prior to grading and replanting shall commence immediately afterward.

L. Developments shall integrate features such as landscaping, open areas, and pathways with those of Guajome Regional Park while also establishing a clear demarcation between public and private property.

II. Community Development

GOAL: The continual long term enhancement of the community through the development and use of land which is appropriate and orderly with respect to type, location, timing, and intensity.

2.0 Subdivision of Land or Real Property

OBJECTIVE: To create legal divisions of land or real property that shall provide long-term enhancement for the community.

Policies:

A. No proposed division of land or real property shall be created which fails to implement the General Plan, City policies and ordinances, or development standards.

B. Any City action creating a legal division of land or real property shall identify and consider adjacent and surrounding land uses and land divisions to assure compatibility and proper integration.

C. A subdivision of land or real property must provide adequate on-site improvements consistent with the general plan, including street design, drainage and sanitary facilities, and easements.

D. A subdivision of land or real property must include provisions for off-site improvements or the payment of fees for off-site improvements consistent with the General Plan, including temporary and permanent school facilities, road and bridge improvements, parks, and sewers.

E. A subdivision of land or real property must be designed to accommodate, protect, and preserve environmentally sensitive areas identified in the General Plan.

2.01 Commercial Subdivision

OBJECTIVE: To assure commercial subdivisions of land shall promote long-term economic efficiency and provide benefits to the community.

Policies:

A. Commercial parcels shall be of sufficient size and dimensions to allow for the efficient potential reuse of the parcel.

B. Subdivision of commercial lands shall encourage wherever possible the unification of access and site design with adjacent and surrounding commercial land uses.

2.02 Residential Subdivision

OBJECTIVE: To assure residential subdivisions of land shall be of sufficient size, dimensions, and topography to promote overall community enhancement, and the aesthetic and efficient functioning of the particular residential unit.

Policies:

A. Individual residential parcels shall provide building pad areas of sufficient size and dimensions to accommodate an aesthetically pleasing and efficient dwelling unit.

B. Individual residential parcels shall be organized or laid out in a fashion that promotes functional and aesthetically pleasing neighborhoods.

C. Individual residential parcels shall provide building pad areas that are reflective of the minimum lot area established for the area.

D. Individual residential parcels that have large unusable areas shall be discouraged.

2.03 Agricultural Subdivision

Policy:

A. The City shall assure in all actions that the legal parcels or interests in agricultural lands are of sufficient size to viably conduct agricultural practices.

2.1 Industrial Development

OBJECTIVE: To promote industries which are consistent with community enhancement and provide stable tax bases and a balance of employment opportunities.

Policies:

A. Industrially designated lands shall be devoted to industrial uses for the preservation of the City's economic future, employment opportunities, and general welfare.

B. Industrial land uses shall be compatible with surrounding land uses and available community facilities.

C. Ancillary commercial, office, and recreational uses may be permitted when clearly oriented to support the industrial development and serve its population.

D. Storage and warehousing facilities and services shall not be directly accessible to the general public.

E. The City shall enhance positive long-term economic and employment opportunities through the proper allocation and protection of the following industrial designations:

1) General Industrial

2) Light Industrial

3) Research Park

2.11 General Industrial

OBJECTIVE: To provide industrial lands that can accommodate a wide range of industrial uses, including those of relatively high intensity, while minimizing negative impacts to surrounding land uses.

Policies:

A. Areas designated General Industrial shall generally contain a minimum of one hundred (100) acres. Smaller sites may be considered when located adjacent to other industrial areas. General Industrial areas shall have access to a major arterial or higher rated street and shall be physically and visually separated from adjacent non-industrial land uses, preferably by natural topographic features.

B. General Industrial uses shall generally engage in manufacturing, assembly, packaging, processing, and fabrication operations. Warehousing, storage, and distribution facilities may also be permitted.

C. General Industrial areas shall be designed primarily to provide sites for independent, single use developments, although industrial park and multi-tenant developments may also be permitted.

D. Outside operations, equipment, and storage areas may be permitted provided such areas are adequately screened from view.

E. Each industrial use shall provide attenuating structures, devices, and procedures to insure that noise, vibration, odors, glare, heat, and other emissions do not interfere with neighboring industrial activities nor endanger the health, safety, peace, or general welfare of persons residing or working in the surrounding area.

F. Architectural design shall be oriented towards providing functional, efficient, and visually appealing industrial structures. Primary structures shall be of concrete tilt-up or concrete block construction or the equivalent with exterior treatment and features such as aggregate finishes, accent bands, and buttresses. Prefabricated, sheet metal, and portable structures shall be limited for use as offices, storage, and other accessory buildings.

G. Landscaping shall be maintained in all setback, parking, and other open areas to provide screening, buffering, and to enhance the appearance of industrial structures.

2.12 Light Industrial

OBJECTIVE: To provide and protect industrial lands that can accommodate a wide range of moderate to low intensity industrial uses capable of being located adjacent to residential areas with minimal buffering and attenuation measures.

Policies:

A. Areas designated Light Industrial shall generally contain a minimum of two hundred (200) acres. Smaller sites may be considered when located adjacent to land uses of similar intensity. Light Industrial areas shall have access to a secondary arterial or higher rated street either directly or through non-residential areas.

B. Light Industrial uses shall be restricted to uses generally engaged in the manufacturing, assembly, packaging, fabrication and processing of components into finished products rather than the conversion of raw materials. Industrial activity shall be conducted primarily within structures, and outside storage areas and assembly activities shall be limited.

C. Light Industrial areas shall be primarily developed as industrial parks and commerce centers providing both single-use and multi-tenant structures. Independent development for single-use projects on larger sites may also be permitted.

D. Light Industrial developments shall place its emphasis on presenting an efficient, clean and visually appealing industrial environment. Architectural, landscape, signage and development standards shall be coordinated to provide for unified site design.

E. Each industrial use shall provide attenuating structures, devices and procedures to insure that noise, vibration, glare, odors, heat and other emissions are not perceptible outside its boundaries by the natural senses.

F. All storage, assembly and parking areas and equipment shall be completely screened from view. Mechanical equipment, vents, stacks, apparatus, antennae and other appurtenant items shall be incorporated

into the total design of structures in a visually attractive manner or shall be entirely enclosed and screened from view.

G. Deep, extensively landscaped areas shall be provided as a buffer where Light Industrial areas abut residentially designated areas. Whenever possible, unobnoxious uses or facilities such as parking, recreation and patio areas shall be located adjacent to the landscape buffer to further insulate the residential areas from the industrial activities.

2.13 Research Park

OBJECTIVE: To provide and protect industrial lands for the development of communities of high technology, research and development industries and related uses set in campus or park-like settings.

Policies:

A. Areas designated Research Park shall generally contain a minimum of one hundred (100) acres. Smaller sites may be considered when located within or adjacent to other industrial areas. Research Park areas shall have access to a major arterial or higher rated street either directly or through non-residential areas.

B. Industrial uses within this designation shall be restricted to uses that generally engage in the manufacture of low-bulk, high value products, conduct research and development operations, maintain corporate offices or provide satellite facilities for colleges or universities.

C. To encourage the establishment of industrial communities, developments shall provide ancillary uses and facilities to support the industrial operations and serve the needs of their populations. These include, but are not limited to commercial services, conference and convention facilities, daycare centers, recreation facilities and short term housing and lodging.

D. Research Park developments shall establish lot area, setback, and lot coverage standards to provide open, spacious industrial settings. Extensive landscaped areas shall be distributed throughout the development.

E. Excellent architectural design shall be provided throughout each development. Structures shall be designed to provide low profiles and to integrate with surrounding features.

F. Structures shall generally be constructed for single uses. Multi-tenant structures shall be limited.

G. Outside equipment, storage and assembly areas shall be prohibited. Utility structures shall be incorporated into the overall site design to provide aesthetically pleasing forms. Examples of this include decorative pools for cooling systems, corporate art for signage, landscape berms for screening and placing communication equipment in ornamental towers or sculptures.

2.2 Commercial Development

OBJECTIVE: To promote and preserve a balance of successful markets and services in aesthetic, people-oriented associations that are compatible and organized to surrounding land uses.

Policies:

A. The City shall preserve and enhance viable, positive commercial developments through the proper allocation of the following commercial land use designations:

   1) Community Commercial

   2) Neighborhood Commercial

   3) General Commercial

   4) Special Commercial

   5) Professional Commercial

2.21 Community Commercial

Policies:

A. This designation shall provide the community with commercial centers containing a wide variety of commercial establishments. Major tenants shall provide larger, low volume, higher cost items, such as home furnishings, apparel, durable goods, and specialty items and generally have citywide market areas. Support facilities such as entertainment establishments and restaurants shall be encouraged.

B. Development within this designation shall be on sites in excess of thirty (30) acres. Specialized commercial uses requiring less land area may be

considered when of similar intensity, or offering comparative revenue and/or employment generating capacities. Location shall be limited to sites along major arterials or higher rated roads.

C. This designation shall provide for residential use in conjunction with mixed-use development at densities up to 29 dwelling units per acre.

2.22 Neighborhood Commercial

Policies:

A. Neighborhood Commercial shall provide commercial uses which meet the day to day commercial needs of the community. Commercial center development is implicit. Key tenants shall be limited to supermarkets, variety stores, drug stores, specialty stores, and similar businesses. Most retail shops, restaurants and services are permitted as minor tenants and "convenience" businesses may be allowed when well integrated into the center's design.

B. Since Neighborhood Commercial centers will meet the daily shopping needs of the community, they shall be located near residential areas along major arterials or secondary arterials, preferably at their intersections with collector streets. Consequently there shall be limits on their intensity to be compatible with nearby residential areas. Areas shall generally be between ten (10) and thirty (30) acres.

C. This designation shall provide for residential use in conjunction with mixed-use development at densities up to 29 dwelling units per acre.

2.23 General Commercial

Policies:

A. General Commercial shall provide retail shops, restaurants and services which meet the "immediate" commercial needs of the community. High intensity, drive-up/drive-through and convenience businesses shall be developed in commercial centers or clustered together in coordinated site or development plans to avoid the proliferation of driveway-cuts and to accommodate their high traffic generation characteristics.

B. General Commercial shall be designated on small sites of between five (5) and ten (10) acres. General Commercial areas shall be located on streets designated as major arterials or higher or at the intersection of two secondary arterials.

C. Outside of the Coastal Zone, this designation shall provide for residential use in conjunction with mixed-use development at densities up to 29 dwelling units per acre. Within the Coastal Zone, this designation shall provide for both standalone residential use and residential use in conjunction with mixed-use development at densities consistent with those established in the C-2 zoning standards and the Coast Highway Development Incentive District.

2.24 Special Commercial

Policies:

A. Special Commercial shall designate commercial sites within and/or adjacent to areas with unique characteristics, such as scenic areas, historic areas, freeway off-ramps, the Coastal Zone, and other unique or special areas.

B. Signage in Special Commercial developments shall be consistent with any special guidance systems established for the area.

C. Uses and development standards shall be established through the following special policies and identified guidance systems to best utilize and/or protect the unique characteristics of the externality.

D. Outside of the Coastal Zone, this designation shall provide for residential use in conjunction with mixed-use development at densities up to 29 dwelling units per acre. Within the Coastal Zone, this designation shall provide for both standalone residential use and residential use in conjunction with mixed-use development at densities consistent with those established in the C-2 zoning standards and the Coast Highway Development Incentive Overlay (DIO).

2.241 Coastal Zone

Policy:

A. Development on property designated Special Commercial within the boundaries of the Coastal Zone or Local Coastal Program (LCP) Area shall provide coastal dependent, recreational and visitor serving uses and facilities as specified by the LCP and California Coastal Act of 1976 (See Figure LU-16).

B. Residential uses shall be permitted in conjunction with mixed-use development on those properties within the Coastal Zone bearing the General Commercial land use designation. Maximum potential residential densities on these properties are specified in the applicable zoning standards.

C. Standalone residential use shall be permitted within "avenue" segments of Coast Highway as specified in map exhibits in the Coast Highway Development Incentive Overlay. Maximum potential residential densities for standalone residential use are specified in the applicable zoning standards.

2.242 Interstate 5, State Highway 76, and State Highway 78 Corridors

Policies:

A. Commercial sites adjacent to freeway off-ramps and expressway intersections shall coordinate site development to provide joint use

of entrance/exit points, parking areas, freeway/expressway-oriented signage, rest areas and visitor-serving facilities (see Figure LU-17 and LU-18).

B. Given the proximity and visibility from major travel corridors, development shall place a major emphasis on providing visitor-serving uses and facilities. Larger sites may provide commercial development of community serving or higher level.

C. Commercial sites west of Interstate 5 are recognized as entry points to the Coastal Zone and shall be encouraged to provide commercial uses, services and facilities compatible to and in support of coastal dependent uses.

D. Commercial developments shall be encouraged to provide facilities that promote and support the use of public transportation systems.

2.243 Scenic and Recreation Areas

Policy:

A. Commercial developments adjacent to scenic and recreational areas shall provide site design visually compatible with the surrounding open space environment. Development shall feature uses and facilities oriented towards providing support to the recreational or scenic activities of the area (see Figure LU-19).

2.244 Mission San Luis Rey Historic Area

Policies:

A. Commercial development within the Mission San Luis Rey Historic Area shall place a major emphasis on protection of views; provision of architecture, landscaping and streetscapes consistent with the "Mission San Luis Rey Historic Area Development Program and

Design Guidelines"; and provision of visitor-serving uses and facilities (see Figure LU-20).

Figure LU-16
Special Commercial Area
Coastal Zone
(Hardcopy available at the Oceanside Planning Department)

Figure LU-17
Special Commercial Area
Interstate 5 and Expressway 76 Corridor
(Hardcopy available at the Oceanside Planning Department)

Figure LU-18
Special Commercial Area
State Highway 78 and Frontage Property
(Hardcopy available at the Oceanside Planning Department)

Figure LU-19
Special Commercial Area
Scenic and Recreational
(Hardcopy available at the Oceanside Planning Department)

Figure LU-20
Special Commercial Area
Mission San Luis Rey Historic Area
(Hardcopy available at the Oceanside Planning Department)

Village Commercial Core

B. Commercial properties along San Luis Rey Road and in the area of Douglas Drive and Peyri Drive shall be developed to create an intense pedestrian-oriented village commercial area unified by architecture, pedestrian network, and multi-use parking areas on the peripheries. Commercial uses within the village core shall be pedestrian oriented.

C. The special commercial properties on the northwest corner of Douglas Drive and North El Camino Real shall be linked by design and architecture to the Village Commercial Core. However, uses are not limited to pedestrian-oriented commercial, but are encouraged to serve the needs of the individuals traveling along the Douglas Drive Corridor.

Mission Avenue Corridor

D. Commercial properties fronting on Mission Avenue between El Camino Real and Old Grove Road shall be encouraged to develop commercial centers serving surrounding residential areas as well as providing support to the recreation activities of the Mission Area.

Mission Avenue/Old Grove Road

E. Commercial properties at the intersection of Mission Avenue and Old Grove Road shall be developed as a commercial center or group of commercial centers providing neighborhood and/or community-serving businesses and services. Specialty and visitor-serving commercial uses and professional office development shall also be encouraged. The design and placement of structures shall provide an inward focus emphasizing pedestrian activities. The development of strip centers, highway-oriented, and other high intensity development including but not limited to drive-through restaurants, freestanding convenience markets, gas stations, car washes, auto parts or repair stores, and other such similar uses shall not be

permitted. Any project related application shall be required to file a Master Development Plan and shall also comply with the "Mission San Luis Rey Development Program and Design Guidelines" as adopted by the City Council.

Ivey Ranch Commercial

F. Site design and commercial uses shall be coordinated and directed towards protection of nearby scenic and recreation areas.

2.245 College/Vandegrift

Policy:

A. The design and location of buildings, landscaping, signage, parking areas, walls, fences, and other structures or features shall maximize protection to the adjacent single family development. High intensity, highway oriented uses or uses which generally operate outside of normal business hours, including but not limited to drive-through restaurants, convenience markets, gas stations, car washes, auto parts or repair stores and other such uses which are out of character with the surrounding neighborhood shall be prohibited. Any project related application shall file a Master Development Plan (See Figure LU-21.).

2.246 El Camino Real/Mission Avenue[2]

Policies:

The following policies shall apply to the property located southwest of the intersection of Mission Avenue and El Camino Real:

A. Principal vehicular access to the property shall be provided from Mission Avenue. El Camino Real access, if any, shall have approaches designed and constructed as necessary to provide safe sight distance and adequate acceleration for vehicles entering onto El Camino Real.

B. Development of the property shall be designed to accommodate a mix of community- and neighborhood-serving commercial uses and recreational uses which shall be restricted as necessary to limit the overall traffic generation potential so that the El Camino Real/Mission and Fireside/Mission intersections shall operate a Level

[2] Addendum to Land Use Element Text, GPA-12-87 City Council Resolution No. 88-133 (5/25/88)

of Service (LOS) of C or better during off-peak hours, and at LOS D or better during peak hours.

C. The design and location of buildings, landscaping, signage, parking areas, walls, fences, and other structures shall maximize protection to the surrounding residential and institutional developments.

D. Full geotechnical and hydrological investigations shall be required concurrently with all development applications on the property to identify the constraints, hazards, the nature, and scope of work necessary for the development of the property and the potential off-site impacts.

E. Dedication of right-of-way for State Route 76 shall be provided as necessary through future development application approvals.

Figure LU-21
Special Commercial Area
College Boulevard and Vandegrift Boulevard
(Hardcopy available at the Oceanside Planning Department)

2.247 Southwest Corner of Frazee Road and Old Grove Road[3]

Policies:

A. Commercial properties at the intersection of Old Grove Road and Frazee Road shall be developed as a commercial center. Low intensity specialty and visitor-serving commercial as well as professional office development shall also be encouraged. The design and placement of structures shall provide an inward focus emphasizing pedestrian activities. The development of strip center, highway-oriented, and other high intensity development including, but not limited to, drive-through restaurants, convenience markets, gas stations, car washes, auto parts or repair stores, and other similar uses shall not be permitted. Any project-related application shall be required to file a Master Development Plan and shall also comply with the "Mission San Luis Rey Development Program and Design Guidelines".

B. The design and location of buildings, landscaping, signage, parking areas, walls, fences, and other structures shall maximize protection to the surrounding residential areas.

C. Access driveways shall be limited to provide necessary points of ingress and egress.

D. Prior to development, a landscaped screening wall will be constructed along the eastern side of Old Grove Road north of Scarlet Oak Drive along the open space areas within Williams Ranch Unit #1 and #2.

2.25 Professional Commercial

[3] Addendum to Land Use Element Text, GPA-6-88 City Council Resolution No. 88-253 (11/2/88)

Policies:

A. This designation shall provide the community with a wide variety of professional office, administrative, and business service uses. Development intensities shall vary and shall be subject to and reflective of surrounding uses and characteristics.

B. Since professional uses vary in degrees of intensity, locational requirements shall be implemented to ensure compatibility with surrounding land uses. Professional designations shall be located on secondary arterials or higher. High intensity, high traffic generating uses shall be encouraged to locate adjacent to institutions, developments, or facilities of a comparable level of intensity.

2.26 Commercial Enhancement

Policies:

A. The City shall encourage the establishment of specialized districts, centers, and developments for unique commercial uses which contribute positively to the City's revenue and employment generating abilities and cultural enhancement.

B. The City shall not permit the proliferation and/or over-concentration of commercial uses that generate adverse impacts to the social structure, visual quality, economy, public safety, or well-being of the community.

2.27 Commercial Design

Policies:

A. Commercial architecture shall emphasize establishing prominence and identity to businesses while presenting tasteful, dignified, and visually appealing designs compatible with their surroundings.

B. Landscape design shall incorporate areas for benches, trash receptacles, bicycle racks, and other forms of street furniture where appropriate.

C. Parking areas shall be designed to meet the following criteria:

1) Parking spaces shall be provided in sufficient number to serve all proposed and probable uses within the development.

2) Parking areas shall balance the number of spaces according to individual tenant requirements.

3) Parking spaces shall be located within convenient walking distance to commercial structures.

4) Access lanes shall be located so not to disrupt pedestrian movements nor traffic flow from parking area loading aisles.

5) Compact parking spaces shall be well dispersed throughout the parking area.

D. Trash disposal areas and loading/unloading facilities shall be screened from view and, whenever possible, separated from customer serving areas.

E. All commercial developments shall be designed to insure that visual, noise, lighting, traffic, and other negative impacts do not adversely affect surrounding residential areas.

F. Where appropriate, walkways, arcades, concourses, malls, plazas, courtyards, and other pedestrian-oriented design features shall be provided to encourage pedestrian movement within the development and to adjacent developments.

G. The phasing of commercial projects shall be permitted to allow initial development and expansion in response to demographic and economic changes. Site designs shall illustrate the ultimate development of the property and/or demonstrate their ability to coordinate and integrate with surrounding commercial properties.

H. The City shall not approve any phasing plan that allows a development or use that is inconsistent with the site's land use designation.

2.3 Residential Development

OBJECTIVE: To direct and encourage the proper type, location, timing, and design of housing to benefit the community consistent with the enhancement and establishment of neighborhoods and a well balanced and organized City.

2.31 Residential Designations

Policy:

A. The City's residential lands shall be designated as shown in Table LU-1.

Table LU-1
Residential Land Use Designations

Designation Title	Potential Range of Dwelling Units per Gross Acre*	
	Base Density**	Maximum Potential Density**
Estate A	0.5	0.9
Estate B	1.0	3.5
Single Family Detached	3.6	5.9
Medium Density A	6.0	9.9
Medium Density B	10.0	15.0
Medium Density C	15.1	20.9
High Density	21.0	28.9
Urban High Density	29.0	43.0

* Explanation of developable and non-developable lands:
Density ranges of residential designation do not imply minimum and maximum residential densities that can be uniformly applied to any particular site.

Physical characteristics of a site along with a site's relationship to external factors can modify a site's density. A careful examination of City policy should be made to clarify developable lands and undevelopable lands within a particular site.

** Explanation of residential density ranges:
Densities between the base density and maximum potential density within each residential density range represent density potentials that could be obtained on developable portions of a site.

2.32 Potential Range of Residential Densities

Policies:

A. The base density shall be considered the appropriate density for development within each residential land use designation.



B. Residential projects that possess an excellence of design features shall be granted the ability to achieve densities above the base density. Project characteristics that exceed standards established by City policy and those established by existing or approved developments in the surrounding area will be favorably considered in the review of acceptable density within the range. Such characteristics include, but are not limited to the following:

1) Infrastructure improvements beyond what is necessary to serve the project and its population.

2) Lot standards (i.e. lot area, width, depth, etc.) which exceed the minimum standards established by City policy.

3) Development standards (i.e. parking, setbacks, lot coverage, etc.) which exceed the standards established by City policy.

4) Superior architectural design and materials.

5) Superior landscape/hardscape design and materials.

6) Superior recreation facilities or other amenities.

7) Superior private and/or semi-private open space areas.

8) Floor areas that exceed the norm established by existing or approved development in the surrounding area.

9) Consolidation of existing legal lots to provide unified site design.

10) Initiation of residential development in areas where nonconforming commercial or industrial uses are still predominant.

11) Participation in the City's Redevelopment, Housing, or Historical Preservation programs.

12) Innovative design and/or construction methods that further the goals of the General Plan.

The effectiveness of such design features and characteristics in contributing to the overall quality of a project shall be used to establish the density above base density. No one factor shall be considered sufficient to permit a project to achieve the maximum potential density of a residential land use designation.

C. Residential projects with densities below the base density shall be considered to be consistent with the land use designation.

2.33 Residential Unit Types Consistent With Residential Designations

Policies:

A. The Residential Land Use designations shall reflect residential unit (or building) types of a residential development, not simply the overall number of dwelling units per acre.

B. Certain existing residential developments contain large open space areas that result in densities below the base density of their land use designations. Therefore, it shall be recognized that the land use

designation reflects the density of the developed sections of these projects and that open space areas shall be preserved as such.

C. Within developments that provide open space areas, the density of the minimum lot area shall not exceed the maximum allowable density within its land use designation (i.e. the minimum lot area shall not be less than that which would otherwise have been permitted if open spaces were not provided).

D. To assure residential land use designations accurately reflect residential unit types, residential unit types shall be allowed in the various residential land designations according to Table LU-2.

Table LU-2
Residential Unit Type/Residential Land Use Designation Consistency Matrix

Residential Development Types								Residential Land Use Designations
Single-Family Detached			*Single-Family Attached*			*Multi-Family Unit Structure*		
SU-C	SU-V	SU-M	TU-C	TU-V	MP	MUS	GQ	
X								Agricultural (Non-Residential)
X								Estate A (.5-.9 DU/AC)
X								Estate B (1-3.5 DU/AC)
X								S-F Detached (3.6-5.9 DU/AC)
	X	X	X	X	X			Med. Density A (6-9.9 DU/AC)
					X	X		Med. Density B (10-15 DU/AC)
						X		Med. Density C (15.1-20.9 DU/AC)
						X		High Density (21-28.9 DU/AC)
						X		Urban High Density (29-43 DU/AC)
							X	Civic Institutional (Non-Residential)
							X	Private Institutional (Non-Residential)

SU-C = Single Unit-Conventional
SU-V = Single Unit-Variable
SU-M = Single Unit-Manufactured
TU-C = Two Unit-Conventional
TU-V = Two Unit-Variable
MP = Multi-Plex
MUS = Multiple Unit Structure(s)
Q = Group Quarters

Single Family Detached	**Single Family Attached**	**Multi-Dwelling Unit Structures**
SU-C	TU-C	MUS
SU-V	TU-V	GQ
SU-M	MP	

Note: Any reference to residential housing types or residential land use designations in this Land Use Element is not intended to preclude mobile home parks in any residential land use designation as authorized by State law; provided that, appropriate provisions shall be incorporated into the Zoning Ordinance to require a Conditional Use Permit for any proposed mobile home park.

Note: Allowable residential unit types in mixed-use development on Coastal Zone properties bearing the General Commercial land use designation are determined by the Land Use Plan of the City's Local Coastal Program.

2.34 Residential-Unit Types

Policies:

A. Residential dwelling unit types shall be defined as follows:

Single Family Detached Dwellings

Single Unit – Conventional (SU-C) – A detached structure containing one dwelling unit. The structure is constructed to fixed development standards established by the City policy and the Zoning Ordinance and serves as the only dwelling unit on the property. The property is a legally subdivided lot with the minimum lot area and dimensions established by the Zoning Ordinance.

Single Unit – Variable (SU-V) – A detached structure containing one dwelling unit. The structure is constructed to development standards established by City policy and a Development Plan or a Master Development Plan and serves as the only dwelling unit on the property. The property is a legally subdivided lot with the minimum lot area and dimensions established by a Development Plan or a Master Development Plan. The property generally holds an interest in common areas and facilities.

Single Unit – Manufactured (SU-M) – A detached structure containing one dwelling unit that is constructed elsewhere and transported or assembled on the site. The site is any area or tract of land where two or more lots are rented or leased or held out for rent or lease to accommodate mobilehomes or manufactured units used for human habitation. This category is controlled by State law (Title 25).

Single Family Attached Dwelling

Two Unit – Conventional (TU-C) – A structure consisting of two dwelling units attached by a common wall. Each unit is constructed on a legally subdivided lot and attached to its companion unit on the common

property line. Development and lot standards are established by City policy and the Zoning Ordinance.

Two Unit – Variable (TU-V) – A structure consisting of two dwelling units attached by a common wall. Each unit is constructed on a legally subdivided lot and attached to its companion unit on the common property line. Development and lot standards are established by City policy and a Development Plan or Master Development Plan and properties generally hold an interest in common areas and facilities.

Multi-Plex (MP) – A structure consisting of three or more dwelling units attached by common walls. Each unit is constructed on a legally subdivided lot and attached to one or more companion units on a common property line or lines. Development and lot standards are established by City policy and a Development Plan or Master Development Plan and properties generally hold interest in common areas and facilities.

Multiple Family Dwellings

Multiple Unit Structures (MUS) – A structure or group of structures containing two or more dwelling units on a single property. Subdivision of the property may exist to permit ownership of air space in the form of a dwelling unit with an undivided share in common elements. The property may also be divided for the purpose of ownership in the form of a stock cooperative.

Group Quarters (GQ) – A structure or group of structures containing three (3) or more units rented or leased or held out for rent or lease for the purpose of human occupancy in excess of thirty (30) consecutive calendar days. Such units provide only sleeping and bathroom facilities and are served by centralized dining and kitchen facilities.

2.35 Dwelling Unit/Land Use Consistency Through Density Reduction

Policies:

A. A residential project may be developed using the residential unit type(s) allowed within the next lower residential land use designation provided:

   1) The density of the project or that portion of the project is within the permitted range consistent with the proposed unit type as determined by the Residential Unit Type/Residential Land Use Designation Consistency Matrix.

   2) The project is consistent with the objectives of the General Plan and other City policies.

   3) The project does not interfere with the efficient and proper provision of City services.

B. The appropriate density of such residential projects shall be determined by the criteria established by Policy 2.32 of this element.

C. The City shall, in its annual review of the General Plan, redesignate the sites of such residential projects to the appropriate land use designation.

2.4 Institutional

OBJECTIVE: To provide for and protect areas within the City for both private and public institutional type uses.

Policies:

A. Developments with this designation are characterized by spacious and extensively landscaped settings stressing retention and enhancement of natural features. A strong emphasis is also placed on excellent architectural quality and compatibility.

B. Developments within this designation are also distinguished by a general inward orientation creating a community of complementary uses. To support this, ancillary commercial and short-term housing and lodging such as hotels, dormitories, and guest homes may be permitted when clearly oriented to serve the population of the development.

2.41 Civic Institutional

Policy:

A. This designation provides for public and quasi-public uses and facilities. These include, but are not limited to, public schools, colleges and universities, facilities for public services and utilities, community centers, and other government buildings.

2.42 Private Institutional

Policy:

A. This designation provides for private uses and facilities that by their nature are situated in campus or park-like settings. These include, but are not limited to, the following:

1) Religious institutions providing places of worship, religious study, instruction or retreats, traditional arts and crafts, and related activities.

2) Private schools, colleges, and universities providing education and instruction in professional, vocational, technical, and academic fields.

3) Cemeteries and memorial parks which may include mortuaries, mausoleums, and other ancillary structures.

4) Private recreation areas and facilities where activities are conducted primarily out-of-doors and require large open areas. These include but are not limited to golf courses, recreation and country clubs, campgrounds, amphitheaters, equestrian activities, recreation, entertainment, and theme parks.

5) Institutions associated with the medical and surgical arts such as hospitals, sanitariums, and hospices.

2.5 Agricultural

OBJECTIVE: To identify, conserve and enhance Oceanside's agricultural areas.

Policies:

A. Agricultural areas are characterized by their primary function that is to farm, graze, or conduct animal husbandry. Agricultural areas typically involve contiguous tracts of agricultural land uses with only a very minor intrusion of non-agricultural land uses. These nonagricultural land uses are only of the type and size to service the special needs of the agricultural area.

B. Residential development shall be permitted provided such development does not interfere with existing agricultural operations and that the open space character of the area is preserved. Appropriate minimum lot areas shall be determined by the area's topography, adjacent land uses, and the availability of public services and utilities; however, under no circumstances shall lot areas be less than two and one-half (2 1/2) acres. Lot configurations and dimensions shall provide areas of sufficient size to conduct limited, low-intensity agricultural activities such as orchards, gardens, and the keeping of livestock.

C. The City shall, in all proposed actions converting agricultural lands to other land uses, consider the loss of those lands to the potential agricultural productivity to the community; and shall assure that land use compatibility to agricultural lands is fully defined and assured.

D. Land use compatibility is of primary importance to agricultural areas, since land use conflicts between agricultural and non-agricultural uses can force the economic nonviability of agricultural areas.

2.6 Open Space

OBJECTIVE: To identify and preserve a variety of lands that, due to their topography, use, natural resources, values, and/or limitations, are best left in an open or natural state.

Policies:

A. Public parks, flood channels, public and private outdoor recreation facilities, water recharge areas, and water bodies shall be designated as open space.

B. The City shall require open space designation on lands set aside for significant permanent protection and enhancement through the utilization of planned common open space in proposed land development.

C. Lands considered undevelopable within a proposed land development or use shall be offered for designation as open space as a condition of approval of the proposed land development or use.

D. The City shall encourage the preservation of contiguous natural open space that provides wildlife habitat.

E. The City shall cooperate with local, State, and federal agencies in the management of natural resources.

2.7 Community Facilities Management

OBJECTIVE: To provide a consistent level of quality and affordable public services and facilities and to effectively manage development to ensure that a consistent service level is continued.

Policy:

A. Capital improvement impact fees shall be collected at the time a building permit is issued and should consist of four components:

1) A fee based on share of citywide capital improvement expansion and replacement needs represented by the proposed development.

2) A fee to cover additional construction and replacement of capital improvements directly serving the proposed development.

3) Fees must be adequate to cover the full cost of non-citywide facilities serving the development (neighborhood parks, fire, and paramedic facilities), including a reserve for replacement costs.

4) In addition, fees must cover new construction and replacement of citywide facilities.

2.71 Circulation

OBJECTIVE: To provide for a circulation system which incorporates all modes of transportation for the safe and efficient movement of people and goods within and through the City of Oceanside.

Policies:

A. The Circulation Element shall identify and analyze the overall transportation needs of the City of Oceanside.

B. The Circulation Element shall:

1) Contain descriptions of the proposed circulation system;

2) Establish the various interrelationships in the circulation system;

3) Discuss implementation plans for the circulation system; and,

4) Identify standards and criteria for the location, need, operation, and administration of City circulation facilities.

C. The use of traffic reversions, and design circulation patterns on local streets shall be explored to mitigate inappropriate through traffic through neighborhoods.

2.711 Master Street Plan

OBJECTIVE: To provide a balanced circulation system to serve the growing transportation demands within and through the community.

Policies:

A. The Master Street Plan, amended to include updated information with additional analysis of mass transit, aviation, nautical, and non-motorized transportation will constitute the Circulation Element of the City of Oceanside.

B. The Master Street Plan shall establish a network of streets/arterials throughout the City capable of receiving traffic from existing and future collector and local streets.

C. The City shall approve and build streets as per City of Oceanside Engineering Manual Specifications.

D. The City may require additional right-of-way width and additional improvements of major arterials where required for turning movements or to provide access to adjacent properties whenever access is not feasible from a lower classification street system.

E. The City shall:

1) Require development to provide collector and local street improvements according to standards of the City Engineering Department.

2) Require development to dedicate necessary right-of-way when subdivision or development of property adjacent to or straddling streets is proposed and adopted by the Master Street Plan.

3) Require development to provide all necessary grading, installation of curbs, gutters, and parkway tree planting, unless these improvements are provided through other means.

4) Require development to provide a minimum of half street improvements plus twelve (12) feet of pavement in accordance with City standards.

5) Should development be within an area subject to a Major Thoroughfare Fee provision established by the City Council, the City shall require the following:

a) Payment of the Major Thoroughfare Fee as required by Ordinance No. 80-30 and the latest City Council resolution setting such fee; or

b) Obtain reimbursement of the required fee as the development installs the necessary improvements, and the City's construction cost estimates of the improvements are greater than the required fee. Should the improvements be less than

the required fee, the developer shall pay the difference to the City of the required fee and the City's cost of the improvement.

6) The development will install all sidewalks and curbs as required in their permanent location to provide for maximum design development.

F. If the location and traffic generation of a proposed development would result in congestion on major streets (less than Service Level C - stable traffic flow) or promote safety hazards, the proposed development should in that case be required to make the necessary off-site improvements (subject to reimbursement from impact fees to be collected) or the development should be deferred until financing for the improvements is assured.

2.712 Non-Motorized Transportation

OBJECTIVE: To enhance environmental and social benefits for the citizens of Oceanside by provision of an integrated system of bicycle and pedestrian networks with associated facilities for the safe and efficient movement of people in and through the City of Oceanside.

2.7121 Bicycle Facilities

OBJECTIVE: To provide an integrated Bicycle Circulation System and Bicycle Facilities to promote the environmental and social benefits of commuter and recreational bicycling. The Bicycle Circulation System and Bicycle Facilities shall provide mobility and safety to all persons and areas within the City of Oceanside.

Policies:

A. Development shall provide Class II Bikeways (Bike Lanes) on all secondary, major, and prime arterials.

B. Collector streets which function as links for the Bicycle Circulation System shall require Class II Bikeways (Bike Lanes). In such cases the City shall reduce hazards to cyclists on collector streets by eliminating on-street parking.

C. The City shall provide connection and continuation of the Pacific Coastal Corridor and the San Diego-Anza Borrego Corridor Bicycle Facilities as identified in the Regional Transportation Plan of San Diego County.

D. The use of land shall integrate the Bicycle Circulation System with auto, pedestrian, and transit systems:

1) Development shall provide short-term bicycle parking and long-term bicycle storage facilities such as bicycle racks, pedestal posts, and rental bicycle lockers.

2) Development shall provide safe and convenient bicycle access to high activity land uses, such as schools, parks, shopping, employment, and entertainment centers.

E. The City shall continue seeking funds at the private, local, and federal levels for bicycle circulation system expansion.

2.7122 Pedestrian

OBJECTIVES:

1. Provide for safe pedestrian circulation throughout the City, including sidewalks, pedestrian access to the beach, pedestrian malls, and hiking trails.

2. Provide access for the handicapped and elderly population to assure them safety and mobility.

Policies:

A. The construction of five (5) foot wide sidewalks adjacent to the curb shall be required in all new developments and street improvements.

B. The City shall protect pedestrian access to the public beach by maintaining easements and causing the construction of stairways and "walk-throughs" where appropriate.

C. The City shall encourage the inclusion of greenbelts and common open space for pedestrian use in residential development.

D. The City shall in accordance with State law, provide access for the handicapped and elderly to all public buildings by the removal of architectural barriers.

E. The City shall assure public access to the Beach/Strand with the dedication of public right-of-way easements, construction of stairways, and acquisition of land for park development.

2.713 Public Transit

OBJECTIVE: To provide adequate bus service, light rail transit, and support facilities to satisfy the needs of the community and region.

2.7131 Transit System

Policies:

A. The City shall coordinate and encourage the existing bus system to serve newly developed areas.

B. The City shall investigate the responsibilities of development in providing necessary on-site and off-site bus system improvements including bus shelters within new commercial, residential, and industrial developments.

C. The City shall cooperate with relevant entities and agencies in the development of regional public transportation systems and facilities.

D. The City shall encourage the development of light rail transit corridors in the City, North County, and the region as a whole.

2.7132 Railroad

OBJECTIVE: To improve and modernize railroad facilities within Oceanside and the region.

Policy:

A. The City shall encourage the use of the railroad right-of-way for landscaping, parking facilities, recreation areas, and similar uses.

2.72 Utilities

OBJECTIVE: To assure the long-term efficient economic and aesthetic provision of public utilities to the City and its residents and businesses.

2.721 Utility Corridors

OBJECTIVE: To provide sufficient buffering from utility corridors and surrounding land uses to protect the public safety and welfare and ensure the long-term use of utility corridors.

Policies:

A. The City shall require sufficient screening, fencing, noise attenuation, landscaping, open space setbacks, or other permanent mitigation or buffering measures between utility corridors and adjacent and surrounding land uses. The employed measures shall be of sufficient scope to minimize to the maximum extent possible negative impacts to adjacent surrounding land uses from the particular utility corridor.

B. The City shall encourage the coordination combination of multiple utilities into one unified corridor or corridor network. By consolidating utility corridors negative impacts associated with utility corridors can be more effectively and efficiently mitigated overall corridor maintenance costs are decreased, less land is used in corridor right-of-ways, and the citizens of Oceanside will have a clearer understanding of the importance and scope of a utility corridor network.

C. The City shall restrict any development, improvement, and/or use of a utility corridor to assure the long-term low cost maintenance of the utility or utility corridor.

D. Pipelines transporting crude oil or natural gas from local off-shore drilling operations shall not be permitted within public rights-of-way or other utility corridors.

2.722 Water Supply and Distribution

Policies:

A. The City of Oceanside, which buys water from the San Diego County Water Authority, is responsible for storage facilities and distribution system.

B. Water supply and distribution facilities shall be funded by assessment districts except in older portions of the City that already have service.

C. New development in unserved areas shall be approved only where an assessment district is formed that will provide storage facilities and distribution system prior to occupancy.

D. The water supply and distribution system shall be designed for logical service unit area to allow for development of the services unit area at the intensity proposed by the General Plan.

E. Should assessments be expanded to include new properties, the property owners of the original assessment shall be appropriately reimbursed for any resulting over assessments.

F. If the site of a proposed development does not meet these standards, a decision among the following alternatives should be made:

1) Approval based on plans to improve the water system using revenues from citywide connection fees and user charges. This would be appropriate in some infill locations.

2) Approval upon payment of fees by the developer adequate to cover the development's share of needed improvements.

3) Deferral of approval until a plan for financing water service can be prepared and approved.

4) Deferral of approval until the supply of developable land with water service is reduced or extension of service to nearby land makes further extension logical.

2.7221 Financing Principles

Policies:

A Where no assessment districts exist and water is not currently provided, development will be approved only upon formation of a district to finance water storage and distribution.

B. Where a single purpose assessment district exists or existing districts provide for only a portion of the need, development will be approved only upon the formation of an overlay district to provide the missing services.

2.723 Sewage Collection And Treatment

Policies:

A. All new housing in the City of Oceanside shall pay a "per-unit" sewer connection charge.

B. The system should be designed for a logical service unit to allow for full development of the service area at the intensity proposed by the General Plan.

C. When facilities are built that benefit property not assessed, provisions should be made for reimbursement of owners of property assessed from later assessments of the property benefited.

D. If the site of a proposed development does not meet these standards, a decision among the following alternatives should be made:

1) Approval based on plans to improve the sewer system using revenues from citywide connection fees and user charges. This would be appropriate in some infill locations.

2) Approval upon payment of fees by the developer adequate to cover the development's share of needed improvements.

3) Deferral of approval until a plan for financing sewer service can be prepared and approved.

4) Deferral of approval until the supply of developable land with sewer service is reduced or extension of service to nearby land makes further extension logical.

2.724 Major Drainage

Policies:

A. The Master Drainage Plan will set standards for citywide drainage.

B. Each assessment district (or tract in an infill area) should provide drainage improvements within its boundaries adequate to handle runoff when the drainage basin is fully developed to the intensity proposed by the General Plan.

2.7241 Financing Principles

Policies:

A. Acreage fees levied citywide or by drainage basin to finance off-site improvements and to reimburse assessment districts or individuals required to build more than their proportional share of improvements.

B. Drainage charges should be based on the amount of runoff and evaluation of the responsibility for the problem combined with the benefits received.

1) Upstream development should bear a portion of the cost, even though it would not be subject to flooding if the drainage system were not built.

2) Downstream property owners who would not be able to develop without the basin-wide system would pay a larger share.

2.725 Energy

OBJECTIVE: To assure the City and its citizens are appropriately served sufficient energy in the long-term.

Policies:

A. The City shall encourage the design, installation, and use of passive and active solar collection systems.

B. The City shall encourage the use of energy efficient design, structures, materials, and equipment in all land developments or uses.

C. The City shall encourage the use of long-term lower cost energy sources.

D. The City shall require the undergrounding of energy transmission lines and distribution systems to new land developments or uses.

2.726 Communication Systems

OBJECTIVE: To provide for the efficient and aesthetic functioning of communication systems within the City.

Policies:

A. The City shall encourage planning for the future communication system needs of individual land developments or uses and the City in general.

B. Communication facilities shall be required to conform visually with surrounding land uses and/or natural features.

C. The City shall require the consolidation and joint-use of communication facilities and structures whenever possible.

2.73 Public Education Facilities

OBJECTIVE: To provide facilities which serve the educational and informational needs of the community.

2.731 Schools

OBJECTIVE: To plan for and provide a consistent level of quality education facilities concurrent with community needs in cooperation with the appropriate local school districts.

Policies:

A. The City shall consider the effect of residential development on the existing and design capacity of all affected educational facilities as defined by the appropriate school district.

B. The City shall provide assistance, if requested, to the appropriate local school district for the maintenance of an acceptable ratio between school enrollment and facility capacity.

2.732 Libraries

OBJECTIVE: The objective of the Oceanside Public Library is to make available and accessible to all people of the City books and other materials that will assist and encourage them to:

- Continually educate themselves
- Keep pace with progress in all fields
- Become better citizens
- Become more capable in their daily occupations
- Develop their creative and spiritual capacities
- Appreciate and enjoy works of art and literature
- Make such use of leisure time as will promote personal and social well-being
- Contribute to the growth of knowledge

2.74 Public Recreation Facilities

OBJECTIVE: To enhance the well-being of City residents by providing opportunities for relaxation, rest, activity, and education through a well balanced system of private and public park and recreational facilities distributed to serve the entire community.

Policies:

A. Enrich the quality of life for all citizens of Oceanside while providing constructive and creative leisure opportunities.

B. Provide recreational experience and programs that contribute to the total health of the individual while meeting the desires of the community as a whole.

C. Provide adequate parkland acreage in both location and size to meet the recreation needs of existing and future residents and to preserve natural resources within the City.

D. Develop park sites to provide diverse recreational facilities to meet the active and passive recreational needs of Oceanside residents.

E. Provide for the optimum functional and aesthetic integration of all recreational, environmental, cultural, and social elements into Oceanside parks.

F. Improve and modernize Oceanside parks to overcome both design deficiencies and any deterioration of existing facilities.

G. Distribute future park sites to equitably serve a greater number of Oceanside residents while reducing annual maintenance and operation costs.

H. Maintain the presence of parklands and open space as a fundamental element to conserve and enhance the natural environment thereby improving the quality and livability of the City of Oceanside.

I. Emphasize trail linkage opportunities between community, County, and State open space systems and recreation facilities and throughout those private developments where deemed both suitable and appropriate.

J. Foster cooperative use of existing land resources and recreational facilities between other public and quasi-public agencies.

K. Operate and maintain Oceanside park and recreation facilities through programs that are designed for the most effective use and enhancement of the park site at the least cost possible.

L. Define basic objectives, financing, and alternative/nontraditional means for timely and balanced development of park and recreation facilities in Oceanside.

III. Natural Resource Management

GOAL: Continual evaluation of the state of the environment and formulation of a program of planned management, wise utilization and preservation of natural resources to ensure the health, safety, and welfare of present and future generations.

Policy:

A. Natural resource management shall be a workable program to conserve natural resources and preserve significant open space.

3.0 Evaluating the State of the Environment

OBJECTIVE: To research and prepare a natural resource management system. This database along with other information shall be used by the City, citizens, and developers to assist in the identification, management, or preservation of natural resources.

Policies:

A. The City shall utilize the requirements of the California Environmental Quality Act (CEQA) as amended to assure that potential impacts to the environment are properly evaluated.

B. The City, through the procedures established by both the State of California's CEQA Guidelines and the City of Oceanside's Local CEQA Guidelines, shall identify, evaluate, and mitigate significant impacts to the environment.

C. The City shall assure the proper evaluation through the environmental review process of sensitive and potentially valuable wildlife habitats. Such habitats include, but are not limited to:

1) Wetland Habitats such as:

   a) Coastal Marshes
   b) Fresh Water Marshes
   c) All Riparian, Oak or Willow Woodlands
   d) San Luis Rey River Area
   e) Loma Alta Creek Area
   f) Buena Vista Creek Area
   g) Buena Vista Lagoon Area
   h) Guajome Lake Area

2) Sensitive Habitats or Vegetation Associations such as:

   a) Coastal Sage Scrub Vegetation
   b) Heavy Clay Soils within Coastal Sage Scrub Vegetation
   c) Maritime Desert Scrub Vegetation
   d) Cliffs and Banks above the San Luis Rey River
   e) Natural drainage areas

D. The City shall recognize the importance of sensitive or potentially valuable wildlife habitats and support efforts to preserve these resources.

E. The City shall develop a natural resource management data base. Until the natural resource management data base system is prepared, resource sensitivity analysis shall be required of projects which pose an impact on the City's natural resources. Resource sensitivity analysis shall be consistent with goals, objectives, and policy of natural resource management.

3.1 Environmental Resource Management

3.11 Vegetation And Wildlife Habitats

OBJECTIVE: Recognition and preservation of significant areas with regard to vegetation and wildlife habitats.

Policies:

A. A biological survey report, including a field survey, shall be required for a proposed project site if the site is largely or totally in a natural state or if high interest species of plants or animals have been found on nearby properties.

B. Where appropriate, the City shall apply open space land use designations and open space zoning to areas of significant scenic, ecological, or recreational value.

C. In areas where vegetation or wildlife habitat modification is inevitable, mitigation and/or compensatory measures such as native plant restoration, land reclamation, habitat replacement, or land interest donation will be considered.

D. Areas containing unique vegetation or wildlife habitats shall receive a high priority for preservation.

E. Specific plans shall be developed in conjunction with regional and County agencies where appropriate, for areas where there is occurrence of endangered or threatened species.

3.12 Floodplain

Policies:

A. Construction is prohibited within the floodway and restricted in the floodplain by requiring flood-proofing measures for all structures.

B. The City shall require property owners with land adjacent to the floodway to make reasonable channel improvements concurrent with development of their land or to contribute to a fund for future improvement of the length of the channel by the City.

C. The entire length of Loma Alta Creek will be channelized due to the intensity of land use in the area. Improvements shall be based on containing 100-year flood flows.

3.13 Erosion and Siltation Controls

OBJECTIVE: To preserve the Buena Vista Lagoon's critical habitats by a comprehensive program of erosion and siltation control.

Policy:

A. The City shall continue to participate in the Buena Vista Lagoon Joint Powers Committee and to implement recommendations made by the Committee.

3.14 Grading and Excavations

OBJECTIVE: To provide mitigation recommendations for grading and excavations in the City of Oceanside.

Policies:

A. Investigation and evaluation of currently affected areas will indicate the measures to be included, such as the following measures:

1) Keep grading to a minimum, leave vegetation and soils undisturbed wherever possible.

2) Plant bare slopes and cleared areas with appropriate vegetation immediately after grading.

3) Chemically treat soils to increase stability and resistance to erosion.

4) Install retaining structures where appropriate.

5) Construct drainage systems to direct and control rate of surface runoff.

6) Construct silt traps and settling basins in drainage systems.

7) Construct weirs and check dams on streams.

3.15 Soils Group 1: La Jolla Group, Linda Vista Foundation, Quaternary Alluvium, and Beach Dune Sands

Policy:

A. The City shall recommend appropriate drainage structures for groundwater and surface water in Soils Group 1, such as:

1) Diverting surface water away from cut and fill slopes.
2) Providing silt traps and setting basins downslope of grading and construction.
3) Requiring drainage of groundwater from Claystone beds.
4) Alluvium may require shoring during excavation due to high groundwater levels, and drainage systems.
5) Beach sand excavations also require shoring.

3.16 Soils Group 2: Igneous and Metamorphic Rocks and Residual Soils

Policies:

A. The City shall recommend against mass grading in Soils Group 2 (generally hard rock formations) due to difficulty and cost.

1) Granitic deposition is associated with springs. Groundwater drainage is recommended for weathered slopes.

2) Deeply weathered soils are unstable in steep slopes geologic investigations.

3) Engineering geologists and soil foundation engineers should consult investigations at individual development sites prior to excavation.

B. The City of Oceanside shall follow the grading ordinance as to enforcement of mitigation measures within the City of Oceanside.

3.17 Coastal Preservation

Policies:

A. The City shall attempt to preserve shoreline beach area as a valuable recreational asset and visitor inducement.

B. The City shall continue with periodic replenishment of beach sand by the Federal government until permanent beach sand management systems are decided on and implemented.

3.18 Air Quality

Policy:

A. The City shall cooperate with the San Diego County Air Pollution Control Board, and participate in the Regional Air Quality Control Strategy (RAQS).

3.19 Agricultural Resources

Policies:

A. The City shall apply agricultural land use designations and zoning classifications to areas of significant productive agricultural use.

B. Extension of City services to agricultural areas will be limited.

C. The City shall encourage participation of agricultural property owners in Williamson Act contracts.

3.2 Cultural Resources

Policies:



A. The City shall encourage open space land use designations and open space zoning or open space easements for the preservation of cultural resources.

B. The City shall encourage the acquisition, restoration and/or maintenance of significant cultural resources by private organizations.

C. Cultural resources that must remain in-situ to preserve their significance shall be preserved intact and interpretive signage and protection shall be provided by project developers.

D. An archaeological survey report shall be prepared by a SOPA (Society of Professional Archaeologists) certified archaeologist for a project proposed for grading or development if any of the following conditions are met:

1) The site is completely or largely in a natural state;
2) There are recorded sites on nearby properties;
3) The project site is near or overlooks a water body (creek, stream, lake, freshwater lagoon);
4) The project site includes large boulders and/or oak trees; or
5) The project site is located within a half-mile of Mission San Luis Rey.

E. The presence of agriculture on a potential project site shall not preclude the requirement for an archaeological survey report if any of the above listed conditions are established.

3.21 Scenic Open Areas

Policy:

A. The City shall encourage the preservation of significant visual open areas.

3.22 Water

Policy:

A. The City shall strive to completely reclaim wastewater for re-use.

3.23 Paleontological Resources

OBJECTIVE: Recovery, retention and evaluation of paleontological resources.

Policy:

A. Paleontological survey reports shall be prepared by a qualified paleontologist approved by the City for all proposed projects that are located in the area designated as having a high potential for fossils on the City's natural resource management data base system.

3.3 Mining

OBJECTIVE: To provide for the conservation and development of mineral deposits of local and regional significance and to allow the environmentally sensitive extraction of said deposits while minimizing land use conflicts.

3.31 Mineral Resource Areas

Policy:

A. Mining operations shall be restricted to the following areas which contain mineral deposits determined to be of regional significance by the State Mining and Geology Board pursuant to the California Surface Mining and Reclamation Act of 1975 and those found to be essential to the economic well-being of the City (see Figure LU-22).

B. Mineral Resource Areas shall remain in effect until the resource has been depleted or no longer exists in sufficient quantity or quality to be of benefit to the City and/or the region.

C. The City shall not approve, extend, or amend any permit for mining operations that are not located within designated mineral resource areas.

3.311 San Luis Rey River Basin

Policy:

A. The channel and flood-plain of the San Luis Rey River, beginning in the area of the Douglas Drive Bridge and extending upstream to the City limits, contains deposits of construction quality sand which may be extracted provided:

1) Mining operations do not intrude into nor endanger environmentally sensitive habitats or planned habitats.

2) The flow of sand to the Pacific Ocean is not significantly disrupted and that impacts to the City's beaches are appropriately mitigated.

3) Mining operations do not conflict with the San Luis Rey River Flood Control Project and terminate prior to its construction.

4) Sand extracted is used as construction material or for beach replenishment and not for landfill purposes.

5) Mining operations shall be limited to specified time periods not exceeding five (5) years.

Figure LU-22
Mineral Resource Areas
(Hardcopy available at the Oceanside Planning Department)

3.312 South Coast Asphalt Rock Quarry

Policy:

A. The South Coast Asphalt Rock Quarry located southwest of Highway 78 contains deposits of granitic rock that shall be permitted to continue mining operations until expiration of its permit in 1992.

3.313 Crystal Silica

Policy:

A. The mining area of the Crystal Silica Company located northeast of the El Camino Real/Oceanside Boulevard intersection contains deposits of silica sand which shall be permitted to be mined under the provision of its permits and the Rancho del Oro Specific Plan and Development Agreement.

3.32 Land Use Compatibility

Policies:

A. When considering development proposals within urbanized sections of Mineral Resource Areas, the City shall balance the potential loss of the mineral deposit against the value of the development and consider the importance of the deposit to the regional market and not just its local significance.

B. Lands within Mineral Resource Areas designated agricultural or for open space shall be limited to those land uses which are compatible with mining operations or those which do not require high investment in structures, landscaping, or other improvements and thereby precluding mining operations due to the higher economic value of the land and its improvements.

C. Mining operations shall mitigate all adverse impacts to surrounding properties and to public infrastructure improvements.

D. Mining operations shall apply all appropriate measures necessary to avoid soil instability, flooding, or erosion hazards to life and property.

E. The City shall not approve, extend, or amend permits for mining operations within established residential areas or within areas where residential projects have been approved.

F. Proposed developments within or adjacent to Mineral Resource Areas shall provide adequate buffering, building placement, and phasing plans to assure compatibility with existing mining operations.

G. Development within or adjacent to Mineral Resource Areas shall not be permitted if found to significantly interfere with the future or continued extraction of the resource.

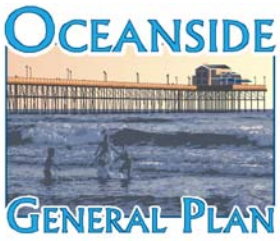
3.33 Reclamation

Policies:

A. All mining operations shall provide reclamation plans to minimize water degradation, damage to aquatic or wildlife habitat, flooding, erosion, and other adverse effects incidental to mining and/or processing activity.

B. Reclamation plans shall insure that all mined lands are reclaimed to a usable condition which is readily adoptable to alternate land uses consistent with their land use designation and creates no danger to public health or safety.

C. Reclamation plans shall provide for the restoration of mined lands to establish landforms and vegetation consistent with the surrounding area.



LAND USE PLAN

The following section identifies specific implementation programs for various goals, objectives, and policies identified in the previous section.

I. COMMUNITY ENHANCEMENT

1. The City shall undertake the preparation of a "Community Appearance Ordinance" to assure a reasonable quality of cleanliness and maintenance on all property within the City.

2. A citywide "Streetscape Master Plan" shall be prepared to provide specific direction for the beautification of all major streets as identified on the "Master Street Plan" and various local streets.

General Plan Revision (1.02)

1. The City shall initiate as necessary, through Council Resolution, proposed revisions to the General Plan. A General Plan Amendment process shall be established to accomplish a systematic review

2. The City shall revise the "Comprehensive Zoning Ordinance" to bring that document into conformance with the City's General Plan Land Use Element.

Community Values (1.1)

1. The City shall survey or gather a consensus of neighborhood and community values annually. That survey shall be included within the City's "General Plan Annual Report".

Balanced Land Use (1.11)

1. The City shall determine the amount, acreage and type of existing and potential land uses annually. This information shall be presented within the "General Plan Annual Report" and shall assist the City in defining and determining the proper balance of land use.

Land Use Compatibility (1.12)

1. A land use/zoning compatibility matrix shall be developed to define levels of zoning compatibility with land use designations.

Neighborhood Character (1.13)

1. Coordinated monuments and/or entrance landscaping shall be developed at major entrance points to each neighborhood area, wherever possible.

2 The City shall prepare and adopt "Community Plans" to provide neighborhood implementation of citywide policies.

The proposed Community Plan Areas are depicted on Figure LU-23.

Conceptual Neighborhood Areas within the Community Plan Areas are depicted on Figure LU-24.

Noise Control (1.14)

1. The City shall update the Noise Element, undertake an implementation program to establish acceptable levels of noise for land use types, and create a noise ordinance for effective enforcement.

Public Safety (1.15)

1. The City shall revise the Public Safety Element of the General Plan to provide detailed policy and implementation programs for the preservation of the public's safety. The City shall utilize existing environmental impact and soils reports in revising the Public Safety Element.

Housing (1.16)

1. The City of Oceanside 2000 Housing Element contains more specific policy statements and programs for the implementation of these overall policies.

Public Facilities Management (1.17)

1. The City shall prepare and adopt a new Community Facilities Element of the General Plan during fiscal year 1986-87 to ensure that a consistent service level is maintained and continued and that financing mechanisms are analyzed and developed to accomplish these objectives.

Site Design (1.2)

1. The City shall provide coordination of City site design standards.

2. The City shall prepare illustrated site design guidelines.

Figure LU-23
Community Plan Areas
(Hardcopy available at the Oceanside Planning Department)

Figure LU-24
Neighborhood Areas within Community Plan Areas
(Hardcopy available at the Oceanside Planning Department)

Undevelopable Lands (1.25)

1. The City shall undertake a program to map all riparian corridors and generalized areas in excess of forty percent (40%) slope and between twenty percent (20%) – forty percent (40%) slope.

Airport Influence Area (1.31)

1. The City shall prepare an "Airport Master Plan" to provide detailed guidance for actions relating to the Oceanside Municipal Airport.

Implementation Of The San Luis Rey River Specific Plan (1.3216)

1. The San Luis Rey River Specific Plan contains more specific policy statements and programs for implementation of these overall policies.

Specific Plan For The San Luis Rey River Flood Control District (1.34)

1. The Specific Plan for the San Luis Rey River Flood Control Project contains specific policy statements and programs for implementation of these overall policies.

Specific Plan/Residential Density Transfer (1.36)

1. The City shall annually update the General Plan to identify developments approved under Specific Plans with residential density transfer mechanisms.

II. COMMUNITY DEVELOPMENT

Agricultural (2.5)

1. The City shall map all agricultural lands within Oceanside and identify their potential agricultural productivity.

Open Space (2.6)

1. The City shall keep a record of private open space areas as identified in existing and approved development projects. These open space areas shall be designated on the land use map annually.

Community Facilities Management (2.7)

1. A Community Facilities Element shall be prepared to establish the framework and fee system to ensure the timely delivery of necessary and desirable capital improvements and services.

Master Street Plan (2.711)

1. The City shall prepare an updated Circulation Element during Fiscal year 1986-87.

Schools (2.731)

1. The City shall prepare a Community Facilities Element of the General Plan that shall define the policies and information programs to provide for school facilities for Oceanside's residents.

Libraries (2.732)

1. The City shall prepare a Community Facilities Element to the General Plan that shall define policies and implementation programs to provide for the present and projected library needs for Oceanside's residents.

Public Recreation Facilities (2.74)

1. The City shall prepare an updated Community Facilities Element in fiscal year 1986-87, which along with the City's updated Master Parks and Recreation Plan shall define specific policies and detailed implementation programs to provide for Public Recreation Facilities for Oceanside's residents.

III. NATURAL RESOURCE MANAGEMENT

Evaluating The State Of The Environment (3.0)

1. The City shall develop a natural resource management database and other information that the City, citizens, and potential developers can utilize to assist in the identification, management, or preservation of natural resources.

2. The City's natural resource management database system shall include information and programs to:

Water:

a) Reduce water consumption on a per capita basis,
b) Minimize pollution of water bodies including lakes, lagoon, rivers, streams, creeks, and ground water,
c) Minimize potential loss of life and property in flood areas, and
d) Dedicate land in flood prone areas to open space.

Soil Erosion and Drainage:

e) Mitigate soil and landform erosion,
f) Plan and engineer land for erosion control, and
g) Work with State, federal, and local agencies to resolve beach erosion.

Biotic:

h) Conserve and enhance vegetation and wildlife habitats, especially areas of rare and endangered or threatened species.

Air Quality:

i) Improve air quality in cooperation with County, State, and federal agencies.

Cultural Resources:

j) Encourage the conservation and protection of significant cultural or scientific resources for future scientific, historic, and educational purposes.

Scenic Resources:

k) Encourage the preservation of significant visual open spaces.

J-3 Local Coastal Program Land Use Plan Amendments

I. COASTAL ZONE LAND USE CLASSIFICATIONS

The City's Land Use Element of the General Plan provides a basic framework for the City's LCP Land Use Plan Map (see Exhibit A). Several modifications to land use have been proposed in response to Coastal Act requirements. These include:

-Shorefront properties from The Strand south to Cassidy Street are shown as "Mixed High Density/Transient Residential". This designation was previously applied to portions of The Strand by the Redevelopment Agency, and is intended to allow a mixture of both permanent residential and transient residential uses (such as seasonal rentals, tourist cottages, hotels and motels).

-As required by the Coastal Act, the Land Use Plan makes a distinction between "general commercial" uses and "coastal dependent, recreation and visitor serving commercial" uses. The latter specialized commercial uses are concentrated near the pier (as proposed in the Redevelopment Neighborhood Plan), the Harbor and the San Luis Rey River area.

-A specialized transportation and utility designation is proposed for the AT&SF Railroad right-of-way and the La Salina Treatment Plant. This is more reflective of existing uses than the current "institutional open space" designation.

-Several modifications to residential densities have been proposed based on Coastal Project Committee recommendations, and findings of the draft LCP Housing Study. The most significant of these changes is an increase in densities on portions of the San Luis Rey River Specific Plan area.

The proposed Coastal Zone Land Use designations consist of both a map (Exhibit A) and the narrative text, which follows. A breakdown of land use categories by acreage is provided in Appendix D.

A. COMMERCIAL LAND USES

1. General Commercial – The ~~general~~ General ~~commercial~~ Commercial category allows a variety of retail, service, and office uses. This land use category also allows for residential uses consistent with base zoning standards and the Coast Highway Incentive District (ID). Residential uses are allowed on all General Commercial properties in conjunction with minimum commercial floor area as specified in the ID or as determined through the discretionary review process. As indicated in the ID, General Commercial properties within "avenue" segments of the Coast Highway corridor may accommodate standalone residential uses. Visitor uses, such as restaurants, hotels and motels may be located in this designation, especially on sites with good freeway access and exposure. The major general commercial corridor in the Coastal Zone is along Hill Street.

2. Coastal Dependent, Recreation, and Visitor Serving Commercial – This land use category encompasses specialized commercial uses which are directly dependent, supportive or

related to the coast. Such uses provide services or goods for coastal industries or recreationists, and include boat sales, supplies, and service; diving, commercial fishing, and sportfishing establishments; restaurants, snack bars and convenience markets; gift, sundries, and novelty shops; transient accommodations such as hotels, motels, tourist cottages, campgrounds and recreational vehicle parks; and recreational equipment rentals (such as bicycles, roller skates, surfboards). Within the Coast Highway Incentive District (ID), properties bearing this land use designation may accommodate residential uses in conjunction with minimum commercial floor area as specified in the ID or as determined through the discretionary review process.

The majority of coastal dependent, recreation and visitor serving commercial areas in the Coastal Zone are in three locations: in the Harbor area, near the San Luis Rey River, and east of the municipal pier.

3. Harbor – The Harbor classification applies to all land and water areas governed by the Oceanside Small Craft Harbor District. This is a multiple use category, primarily for boating and Harbor-dependent uses, and secondarily for harbor-related and support services such as open space, recreation, public facilities, visitor-serving commercial, and residential/transient accommodations. The intent of this classification is to ensure that the limited land and water areas in the Harbor are assigned to highest priority uses. Implementation of this land use classification is achieved through development of a specific plan. The Harbor Precise Plan, which was approved by the Harbor District on October 25, 1979, was prepared to serve that function.

B. INDUSTRIAL LAND USES

~~1. Light Industrial – Industrial uses have generally been phased out of the Coastal Zone due to land use compatibility problems and a lack of sites large enough to successfully develop and buffer light industrial uses.~~

~~Only one light industrial site of 11 acres remains in the Coastal Zone. This site is bordered by the Loma Alta Creek Channel on the south, the AT&SF Railroad and La Salina Sewage Treatment Plant on the west, the Escondido railroad spur line on the north and the Hill Street commercial corridor on the east.~~

~~First priority for use of this area would be small Coastal dependent or related industries such as boat building, sail making or a boat repair yard. If, because of the site's small size and isolated location, such coastal dependent uses are not possible, light industrial uses should be allowed.~~

~~Any development on this site should be designed to be visually unobtrusive and compatible with the surrounding area.~~

~~2.~~1. Transportation and Utility – This classification encompasses the two major public utilities in the Coastal Zone: the La Salina Sewage Treatment Plant and the Atchison, Topeka and Santa Fe Railroad.

The treatment plant site includes the plant itself (with area available for possible expansion) and the open space necessary to buffer the plant from surrounding land uses. In the future, land excess to those needs may be considered for conversion to public recreation use, such as beach parking.

The railroad corridor serves as a link in the major passenger and freight line between Los Angeles and San Diego. The corridor includes open space which buffers the railroad from surrounding noise-sensitive land uses and also serves as a reserve corridor for future transportation needs. Air rights or multiple-use of the rail corridor in the downtown area may be possible in the future, but only if future transportation options are not foreclosed and substantial public benefits can be gained.

The railroad corridor also includes a site designated for a possible multi-modal transportation facility. This facility would interface rail, local bus, intercity bus, and taxi service in a single facility and, as such, is strongly supported in the LCP policies.

C. RESIDENTIAL LAND USES

1. Low Density Residential – The low density residential classification of 0-7 dwelling units per acre has been applied to neighborhoods which are predominantly built-out with single-family residences. This designation is intended to preserve existing single-family residences in neighborhoods which have basically sound stock with a substantial remaining economic life. Three neighborhoods which posses special character are within this designation: the single-family neighborhood above Buena Vista Lagoon between Hill Street and I-5; the portion of the Eastside north of Laurel Street; and, the St. Malo area.

2. Medium Density Residential – The medium density classification allows up to 15 units per acre. It is proposed in areas which are generally inappropriate for traditional single-family construction, but lack the infrastructure, physical characteristics, or access necessary for high density development. Medium density offers a transition between single-family and high density development.

   A medium density designation is proposed for the mobile home parks located near Loma Alta Creek, as a means to protect that existing development.

3. High Density Residential – The need for affordable housing, energy considerations and the goal of protecting agricultural and rural areas all dictate that the City reserve areas for high density residential development. High density uses have been proposed for flat, accessible sites where community facilities and public services are available to serve the higher numbers of people.

   High density development should not be confused with overcrowding. The City should insist upon good design and site planning to ensure that new high density development does not detract from the attractiveness and “liveability” of the urban environment. In

addition, the City should ensure that high density areas are served nearby by higher levels of amenities and services --- such as public transportation, shopping areas, parks, churches, etc. --- than are normally provided for low and medium density areas.

The density range for this classification is 15 units per acre and up with the upper limit set by the Zoning Ordinance, ~~and~~ Redevelopment Design Guidelines, and the Coast Highway Incentive District (ID). The density for any given project in this category should be based upon site characteristics, compatibility with the surrounding neighborhood, project type, and service availability. For instance, a senior citizen project in the downtown area may be more appropriate for a higher density than a family-oriented project in South Oceanside.

The high density areas in the Coastal Zone have generally been proposed for the lands west of Hill Street. In addition, high density use is also proposed for the one large vacant "unconstrained" parcel left in the Coastal Zone, which is located above Lawrence Canyon.

High density residential properties within the Coast Highway Incentive District (ID) can accommodate commercial land uses in accordance with the provisions of the ID, which include form-based development standards and additional building height and residential density in exchange for specified public benefits.

4. Mixed High Density/Transient Residential – This category is intended to allow both high density residential use and transient accommodations, such as hotels, motels, tourist cottages, and seasonal rentals. Also, limited office or commercial uses which are incidental or ancillary to transient residential uses ---- such as seasonal rental or property management offices -- may be allowed in this designation. Uses in this classification should be designed to be compatible with surrounding development and should not overcrowd public recreational amenities.

   The mixed high density/transient residential classification is proposed for shorefront properties from Ninth Street south to Cassidy Street.

5. Cluster Overlay – The cluster overlay is intended to allow grouping of residential units on the least constrained portions of sites which have some environmental limitations. For example, on a one-acre site designated for low density which is about half flat and half hilly, the cluster overlay would allow up to seven units to be built on the flat portion of the site, with the remainder left in open space.

   The cluster overlay is used to augment the underlying land use designation. It has been applied to two properties in the San Luis Rey River area which are affected by steep terrain.

D. OPEN SPACE

The open space classification encompasses several distinct types of land use. Significant habitat areas such as the San Luis Rey River and Buena Vista Lagoon are to be left in a natural state, with only limited passive recreation use allowed. Public parks, beaches, and coastal accessways are intended to support active public recreation uses. The only "institutional" open space use in the Coastal Zone is Laurel School, which is used primarily for education purposes but does offer limited recreation benefits to the surrounding neighborhood. The final class of open space is constrained lands which are to remain undeveloped because of public health and safety concerns. These lands include the Loma Alta Creek Channel and steep slopes in the San Luis Rey River area.

II. LOCAL COASTAL PERMIT REGULATIONS

This Local Coastal Program Land Use Plan contains many policies which are to be implemented at the time of development permit issuance. For example, one of the access policies states that major new developments on Pacific Street, south of Cassidy Street, should be required to dedicate and build public accessways if adequate access is not available nearby. Other policies require that buffers be maintained adjacent to sensitive habitat areas, drainage improvements be designed to protect water quality, and projects in certain neighborhoods incorporate special design themes.

The overall goal of this section is that permitting procedures for coastal development applicants be consolidated and simplified. Rather than having to obtain several separate permits from the City, Redevelopment Agency, Harbor District and/or Coastal Commission, the LCP proposes that applicants would have to obtain only one permit at the local level, with only limited appeal authority retained by the State Coastal Commission.

In order to uniformly apply all LCP Land Use Plan policies, it is recommended that the City amend its Zoning Ordinance and other regulatory provisions to establish consolidated local discretionary review and approval procedures for the Coastal Zone.

1. Coastal Development Permits would be required of all projects which because size, intensity or location require special review and approval by one or more of the following decision-making bodies: the City Council, Redevelopment Agency, Harbor District Board, or Planning Commission. Where other discretionary permit requirements already exist (such as major subdivisions, development plans, conditional use permits, Redevelopment permits, or Harbor District permits), the Local Coastal Program requirements should be incorporated into those existing procedures.

2. Design Review would be required for all projects where aesthetic issues (such as compatibility with the neighborhood, landscaping adequacy and conformance to design "themes") are a concern. In instances where other discretionary permits (described above) are required, design review should be consolidated with those permit processes. In instances where no other permits are required, design review should be accomplished by either an administrator (such as the Planning Director) or a professional review board, with possibility for appeals to the Planning Commission and City Council.

3. Discretionary Demolition Permits would be required for any demolitions of sound buildings in the permit appeals area and for demolition of sound residences only in the remainder of the Coastal Zone. Under State law, the Building Director has sole authority for determining whether a building should be demolished for health and safety reasons. Therefore, the demolition of condemned buildings, as defined in the State Building Code, would not require any discretionary permits. Regulation of the demolition of sound structures will enable the City to enforce policies concerning Coastal-dependent, recreation, and visitor serving uses, as well as low and moderate cost housing.

Table 2 provides a matrix delineating the type of discretionary approvals which are required to implement the Local Coastal Program. Most of these discretionary approvals are already required by the City. Additional costs encumbered in administering these procedures should be recovered through permit application fees or State reimbursement. The level of review proposed for different types of projects varies according to the size, location or intensity of the project. For example, single-family residences outside the Permit Appeals Area would require no discretionary permits (unless subdivision of land or a zoning variance is involved). Small multi-family or commercial projects outside the Appeal Area would require only administrative design review. Large projects or projects in sensitive areas will require full local hearings for approval. Conditions of approval may be applied to such projects to fully meet the requirements of the LCP.

Table 2

LOCAL DISCRETIONARY REVIEW REQUIREMENTS

TYPE OF PROJECT	COASTAL DEVELOPMENT PERMIT	DESIGN REVIEW	DEMOLITION PERMIT (where applicable)
Projects within Coastal Appeal Area:			
All developments	X	X	*
Projects Outside the Coastal Appeal Area:			Residential Demolitions Only
Single Family Residences			*
Multi Family Projects of 2 to 20 units			"
Multi Family Projects of 20 or more units	X		"
Commercial Uses on sites of less than 2½ acres		X	"
Commercial Uses on sites greater than 2½ acres	X	X	"
Industrial Uses	X	X	"
Subdivisions pursuant to the State Subdivision Map Act	X		
All developments within the Redevelopment Area pursuant to the Redevelopment Design Guidelines	X	X	"
All developments in the Harbor Precise Plan Area pursuant to the Harbor Design Guidelines and Application Procedures	X	X	X

Table 2 (Continued)

LOCAL DISCRETIONARY REVIEW REQUIREMENTS

TYPE OF PROJECT	COASTAL DEVELOPMENT PERMIT	DESIGN REVIEW	DEMOLITION PERMIT (where applicable)
All developments within the San Luis Rey River Specific Plan Area	X	X	* Residential Demolitions Only
Any other uses requiring Conditional Use Permits pursuant to the City's Zoning Ordinance	X	X	"
Sign Permits			
Public Projects such as parks, community buildings, and recreational facilities	X	X	
Shoreline structure projects, such as seawalls, revetments, jetties, groins, etc.			
Mining or extraction of materials	X		

X Indicates projects for which local permits are already required.

* Indicates projects which are currently regulated by the Coastal Commission, but not by the City. The City would assume permit authority for these types of projects upon certification of the LCP.

III. COASTAL PERMIT APPEALS

Once Oceanside's LCP is certified, the City will have sole discretion over the issuance of Coastal Development Permits, except for limited permit and appeal authority to be retained by the State Coastal Commission. Appeals will be allowed only in the following instances:

-For any projects within the permit appeal area, shown on Exhibit B;

-For any major public works projects, costing in excess of $25,000*.

As an LCP Implementation Measure, the City will adopt permit notification, hearing and appeals procedures pursuant to the Local Coastal Program Implementation Regulations recently adopted by the Coastal Commission.

*The Coastal Commission is contemplating a change to their regulations which would raise this amount to $50,000.