
Appendix N

Fehr&Peers

Summer Villas Special Planning Area (SPA)

Transportation Analysis Report

Prepared for:
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SA23-0206

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1. Introduction

1.1. Purpose

The purpose of this report is to analyze the Transportation Impacts associated with the proposed Summer Villas Special Planning Area (SPA). This study analyzes the traffic conditions in the Project vicinity under existing conditions and under cumulative conditions, which represents General Plan Buildout. The transportation analysis addresses VMT, roadway performance, bicycle, pedestrian, and transit facilities and access.

This analysis is necessary because the Project requires a General Plan Amendment and Rezone from Rural Residential (RR) to active adult Low Density Residential (LDR), and a Development Agreement. This report includes existing conditions, regulatory background, analysis methodology and impacts and mitigation measures for Vehicle Miles of Travel (VMT), bicycle, pedestrian, transit, and emergency access.

1.2. Project Description

The Project site is located on the southeast corner of the Sheldon Road/Waterman Road intersection in the City of Elk Grove. The 116-acre Project area is divided into two residential development areas (the “West Neighborhood” and “East Neighborhood”) and two open space areas. The Project includes up to a maximum of 499 single-family active adult (55+) homes designed to allow residents to age in place and create a unique active adult community. In addition to the homes, the community will include a private clubhouse/recreation center, small private park space, and significant open space areas, providing residents access to abundant outdoor recreation opportunities. The two neighborhoods are bisected by a central open space area associated with Laguna Creek (“Laguna Creek Open Space”) and is buffered from Waterman Road by a westerly open space area (“Waterman Recreational Open Space”).

The Project plan consists of the following land uses:

West Neighborhood 150 Single Family homes (31.4 Acres)

East Neighborhood 349 Single Family homes (40.3 Acres)

The Project requires a General Plan Amendment and Rezone from Rural Residential to active adult Low Density Residential. Access to the Project site would include two gated entries at each neighborhood, with one along Waterman Road and three entrances along Sheldon Road. **Figure 1** shows the Project area and general location of the proposed access locations to Sheldon Road and Waterman Road. Chapter 8 includes site access and on-site circulation recommendations that are shown on **Figure 14** (Chapter 8). General recommendations are summarized below:

Sheldon Road

- 1st Access West of Waterman Road** – Realign access to match existing driveway on the north side of Sheldon Road or eliminate access and add an additional access on Waterman Road.

2nd Access West of Waterman Road – Realign access to match planned access on the north side of Sheldon Road.

Sheldon Road – Add center two-way left-turn lane, serving the second and third access west of Waterman Road.

Waterman Road

New Access – Add a new access, replacing first driveway on Sheldon Road west of Waterman Road, if the Sheldon Road driveway is eliminated.

Realign Access – Realign the proposed access on Waterman Road to align with the Crowell Drive intersection.

On-site

Full Access Bridge – Design the planned bridge, connecting the east and west sides of the project to accommodate autos, bikes, and pedestrians.

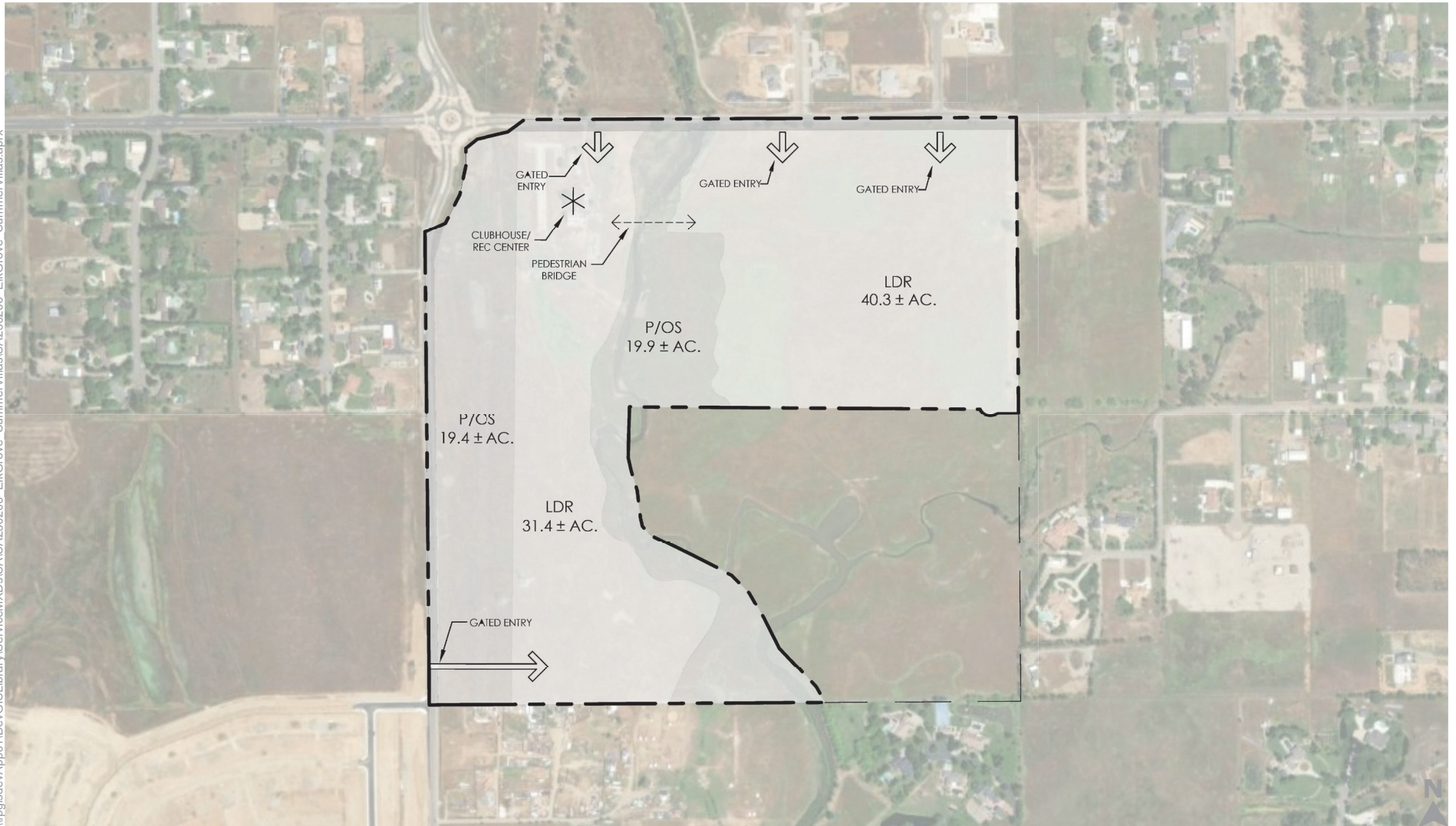


Figure 1



2. Analysis Methodology

This chapter presents the methods used for the analysis of the proposed Project. The methods describe existing conditions data collection, Project travel characteristics, travel demand modeling, VMT analysis, roadway and intersection performance, the analysis of bicycle and facilities, and safety. The procedures outlined below are consistent with the *City of Elk Grove Transportation Guidelines, December 2023*.

2.1. Data Collection

Daily roadway segment counts collected the on Wednesday November 08 and Thursday November 09, 2023. Turning movement traffic counts were collected at the existing study intersections on Tuesday August 20, 2024, during the AM (7:00 AM to 9:00 AM) and PM (4:00 PM to 6:00 PM) peak periods. Local schools were in session with in-person instruction and typical traffic conditions were observed. The existing conditions data is used for the roadway performance analysis.

2.2. Project Travel Characteristics

Project travel characteristics, including trip generation and trip distribution are discussed below. These travel characteristics were used for the roadway performance conducted under existing conditions.

2.2.1. Trip Generation

The proposed Project’s trip generation was estimated using the *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers, 2021), which is the most recent version of the manual. Trip generation for the Project was estimated using the rates for senior-adult housing type (single family). The Project trip generation summarized in **Table 1** was used for the analysis of roadway and intersection performance under Plus Project conditions.

Table 1: Trip Generation

Land Use	Quantity (Dwelling Units)	Time	Trip Rate	% In	% Out	Total Trips	Ins	Outs
Senior Adult Housing – Single- Family (ITE Code 251)	499	Daily	4.31	50%	50%	2,151	1075	1076
		AM Peak Hour	0.24	33%	67%	120	40	80
		PM Peak Hour	0.30	61%	39%	150	91	59

Note:

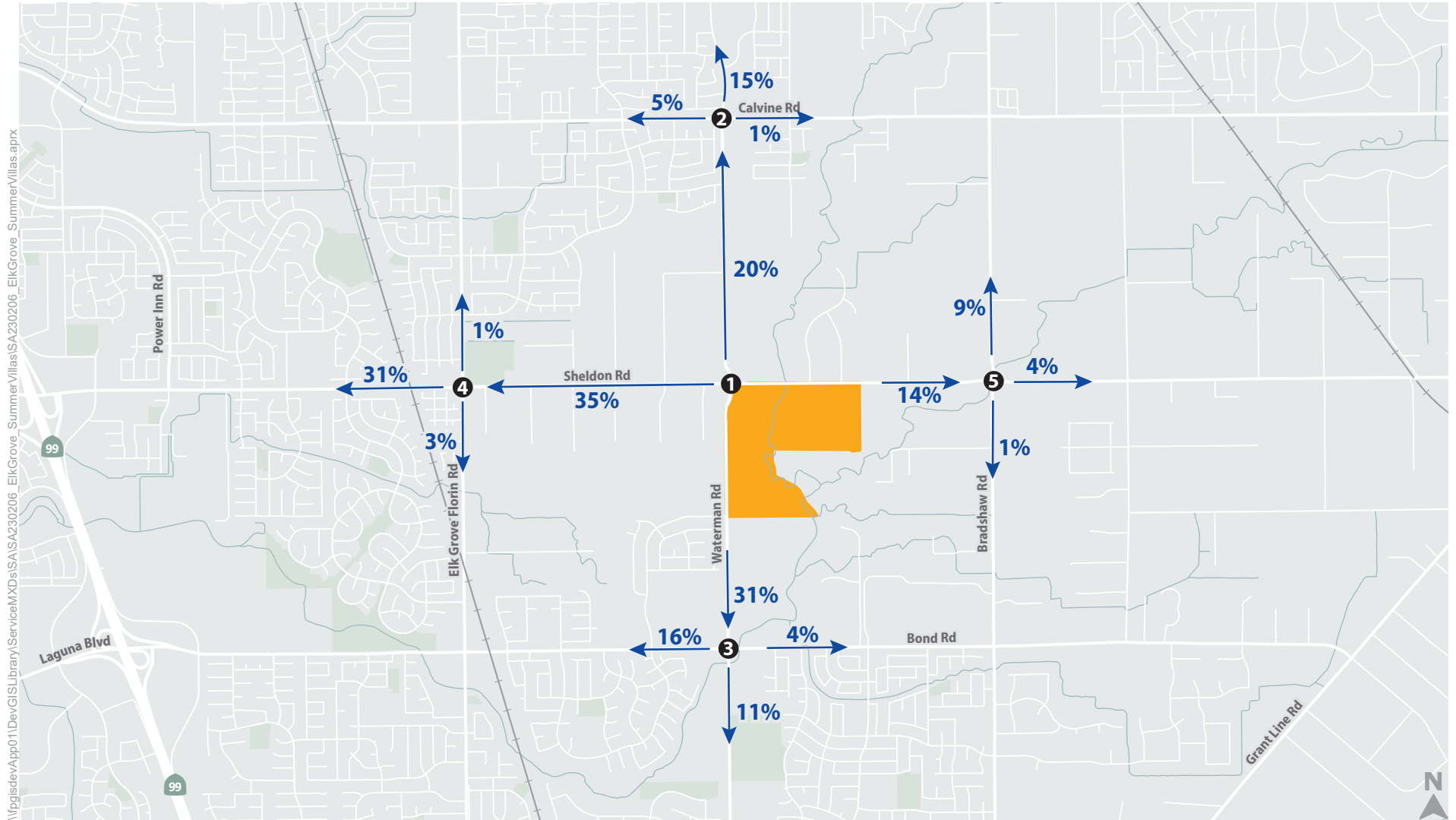
1 – All rates derived from the *Trip Generation Manual, 11th Edition* (Institute of Transportation Engineers, 2021).

2 – Average trip rate applied.

Source: Fehr & Peers, 2025

2.2.2. Project Trip Distribution

The distribution of Project trips was developed using a modified version of the City of Elk Grove Activity-based travel demand model EGSIM20. EGSIM20 is the latest ABM developed by modifying the regional Sacramento Area Council of Governments (SACOG) known as SACSIM19. The Project's trip distribution is shown in **Figure 2**. The trip distribution shows that most of the traffic generated by the Project is expected to travel west using Sheldon Road (31%), Bond Road (16%), and Calvine Road (5%). Only about 4% of the traffic is expected to travel east using Sheldon Road. The rest is expected to be distributed on Waterman Road (14% north, 11% south) and Bradshaw Road (9% north, 1% south). The Project's trip distribution was used to calculate the total Project generated trips on the study roadways and intersections.



XX% → Trip Distribution
 Project Boundary

Figure 2



Vehicle Trip Distribution

2.3. Traffic Forecasting

A modified version of the City of Elk Grove travel demand model EGSIM20 was used for forecasting the study scenarios. The following two model scenarios were used for forecasting.

Base Year Model – 2019/2020 Pre-Pandemic Conditions
Future Year Model – General Plan Buildout Model (Beyond 2040)

Table 2 compares total residential units and jobs under Base Year (2020) and General Plan Buildout conditions.

Table 2: City of Elk Grove Land Use Growth

Model Scenario	Residential Units	Jobs
Base Year (2020)	54,791	45,840
General Plan Buildout	103,460	94,897

Source: Fehr & Peers, 2025

For intersection and roadway analysis, the Project's trip generation and trip distribution were used to estimate Plus Project scenarios. For VMT analysis, EGSIM20 was modified by replacing the General Plan land use assumptions (in the Project area) with the proposed Project's land use.

2.3.1. Study Scenarios

The study analyzes traffic conditions for the following scenarios:

- Existing Conditions (ENP)
- Existing Plus Project Conditions (E+P)
- Existing Plus Approved Projects Conditions (E+AP)
- Existing Plus Approved Projects Plus Project Conditions (E+AP+P)
- General Plan Buildout Conditions (CNP)
- General Plan Buildout Plus Project Conditions (C+P)

In addition to existing conditions and general plan Buildout conditions, the analysis included existing plus approved Project conditions, as the Silverado Village Special Planning Area (SPA) is within the vicinity of the Project site. Throughout this document, the Silverado Village SPA will be referred to as the "approved Project". Forecasts for the E+AP and E+AP+P scenarios included adding the approved Project's trip generation from the Transportation Impact Study for Silverado Village SPA¹ to the existing traffic volumes.

¹ Draft Transportation Impact Study for Silverado Village SPA, April 2013
https://www.elkgrovecity.org/sites/default/files/city-files/Departments/Planning/Regulations/SilveradoVillageSPA_2014-08-27.pdf

2.3.2. VMT Forecasts

The estimation of the Project's VMT performance follows the methods documented in *EGSIM20 – Model Development Report and VMT Methodology* (October 5, 2022), which is included in Attachment A.

2.3.3. Roadway and Intersection Forecasts

This study applies a forecasting procedure known as the "difference method" to develop all future scenario forecasts. The difference method takes the base year model's raw estimates and the future year model's raw forecasts and adds the difference to existing traffic volumes to develop future year forecasts. This method corrects any potential anomalies within the model. The following formula illustrates this forecasting procedure:

$$\text{Forecast Scenario} = \text{Existing Traffic Count} + (\text{Forecast Scenario Raw Model Volume} - \text{Base Year Raw Model Volume})$$

The analysis applies this method to develop intersection turning movement traffic forecasts during the AM and PM peak hours, and daily roadway volume forecasts.

2.3.4. Potential Limitations to Travel Demand Forecasts

Travel behavior and transportation systems are changing quickly in response to emerging trends, new technologies, and different user preferences. Some of the new travel options and technologies emerging in the SACOG region are discussed below.

2.3.4.1. Commuter trends

According to "An American Community Survey Briefs" (February 2024), the pandemic has resulted in more people working from home (5.7% in 2019 to 15.2% in 2022) and a reduction in commuters using public transportation (5.0% in 2019 to 3.1% in 2022). These trends apply to the more than 12,000 State workers who live in Elk Grove (Sac Bee, 2017), as ridership on Sacramento Regional Transit Commuter Routes between Elk Grove and Downtown Sacramento have decreased.

2.3.4.2. Substitution of internet shopping and home delivery for some shopping or meal-related travel

The 2018 SACOG Household Travel Survey (SHTS) showed that adults reported receiving a home delivery of a package on 17 percent of the travel days in the survey—and additional 4 percent received packages at work, food deliveries at home, etc. How these percentages compared to earlier years is not known.

From 2019 (pre-pandemic) to 2023, Cyber Monday sales revenue increased at an average annual rate of 8% (Capital One Shopping Research 2024).

National Household Travel Survey (NHTS) showed the number of online purchases with home delivery doubling between 2009 and 2017, from about 2.5 to 4.9 per household per month (FHWA 2018).

Comparisons of 2017 to 2009 NHTS data show that nationally, non-work trips per household declined by 11 percent. Most of that decline is attributed to lower rates of shopping trips and other family-related errands (FHWA 2018).

2.3.4.3. New travel modes and choices

Transportation Network Companies (TNCs), car share, bike share, scooter share, and on-demand micro transit have increased the travel options available to travelers in the SACOG region and have contributed to changes in traditional travel demand relationships. The current share of resident trips served by TNCs (e.g., Uber, Lyft) is less than one-quarter percent, based on the 2018 SACOG Household Travel Survey (SHTS), and future growth depends on TNCs developing a sustainable business model.

However, the use of privately owned vehicles is still the mode of choice for the great majority of Californians. According to Caltrans², VMT Statewide increased by approximately 15% between 2001 and 2019 despite the state's efforts.

2.3.4.4. Automation of vehicles

Both passenger vehicles and commercial vehicles and trucks are evolving to include more automation. Research, development, and deployment testing is proceeding on fully Autonomous Vehicles (AV), for which no human driver would be required, and the vehicle itself can navigate the roadways to take people or goods where they need to go. Forecasts of how quickly research, development, and deployment testing will transition to full deployment and marketing of fully AV vary widely both on the pace of the transition, and the market acceptance of fully autonomous operation. More uncertainty exists for the behavioral response to AVs. In terms of impact on the transportation system and the environment, a scenario of concern would be one in which AVs are privately owned, like most are at present, but the automated function of the vehicles would entice users to travel more. Examples of this phenomenon could include:

- Vehicles are repositioned to serve different members of a household (e.g., have a car drop a worker at their workplace, then drive back home empty to serve another trip, such as a student going to school). This could add significantly to traffic volumes and VMT.
- The time spent in a vehicle is reevaluated by travelers, resulting in an increase in the willingness to make longer trips.
- There may be an increasing willingness to drive more to avoid parking costs or tolls.

2.3.4.5. Uncertainties in Modeling

Few, if any models, explicitly capture the above-mentioned new modes of travel and emerging trends in travel behavior. Significant uncertainties exist at the present time that prevent explicit modeling of these new modes and emerging trends.

Transportation and mobility are being transformed through several forces ranging from new technologies, different personal preferences, and the unique effects caused by the COVID-19 pandemic, the combination of which could alter traditional travel demand relationships in the near- and long-term future.

The COVID-19 pandemic and subsequent actions by federal, state, and local governments to curtail mobility and encourage physical distancing (i.e., limit in-person economic and social interactions) profoundly changed travel conditions. While travel activity will likely return to some form of normality

² Caltrans, California VMT Data, dot.ca.gov/programs/esta/sb-743/ca-vmt

after government shelter-in-place orders are lifted and the pandemic has concluded, it is likely that some of these temporary changes will influence people's travel choices into the future, including either accelerating or diminishing some of the emerging trends in transportation that were already underway prior to the pandemic.

The traffic counts collected for the transportation analysis pre-date any response to the pandemic. In addition, the travel demand forecasts developed for the transportation analysis of the proposed Project do not account for the potential short-term or long-term behavioral changes that may be instituted to reduce the general public's exposure level to this or other viruses moving forward. Although such measures (e.g., shifting to more telecommuting and virtual meetings) would tend to result in fewer average daily trips for most land uses, the degree that the changes would be implemented and their resilience over time is not known and cannot be predicted with a high degree of confidence. Therefore, they are not reflected in the forecasts.

2.4. VMT Analysis

As outlined above, the estimation of the Project's VMT performance follows the methods documented in *EGSIM20 – Model Development Report and VMT Methodology* (October 5, 2022), which is included in **Attachment A**.

2.4.1. Land Use Project Screening

The City has established specific limits on VMT allowable for each land use Project by General Plan land use designation as well as Citywide limits and limits within each Study Area. Land use Projects must show consistency with the General Plan Land Use Plan. Projects that are inconsistent with the Land Use Plan are automatically considered inconsistent with the VMT policy and shall conduct a VMT analysis. Projects that are consistent with the Land Use Plan move to the next step.

Projects that are not likely to lead to a substantial or measurable increase in VMT and are presumed to be less than significant include, but are not limited to, the following:

- Projects consistent with the General Plan and Zoning and located within low VMT generating areas as determined by the Development Services Director.

- Projects consistent with the General Plan and Zoning and which qualify for a categorical or statutory exemption under CEQA.

- Projects consistent with the General Plan and Zoning and which were covered under a prior CEQA analysis, and where none of the conditions provided in CEQA Guidelines Section 15162 would trigger additional or new analysis.

The Project description and location were assessed to determine if the Project can be screened from VMT analysis.

2.4.2. VMT Performance Metrics

Consistent with CEQA Guidelines, § 15064.7, the City selected VMT per service population as the preferred performance metric, for implementing its VMT policy. Of the performance metrics considered, VMT per service population was the most intuitive to the decision makers and supported implementation of the General Plan by incentivizing development in the City's core and not in sensitive resource areas that the community values. A key emphasis of the General Plan was to plan and develop a better job-to-housing balance so residents can work where they live, and to support more mixed-use development to reduce the need to travel by car for goods and services. The VMT per service population metric is useful since it captures these trip-reduction benefits and accounts for travel from the full range of users and not just residents or just workers.

In addition, the City of Elk Grove uses VMT performance targets by General Plan land use category and VMT limits for the City and study areas, which is an additional step to ensure consistency with the General Plan. Active Adult units on average generate less trips than traditional single-family homes. This was accounted for by adjusting the age of household population in the population synthesis portion of the SACSIM activity-based model (refer to Attachment A for details). In addition, an off-model adjustment was done by comparing the model trip rates for active-adult households with ITE trip rates for the same household type. The Project's total daily VMT were evaluated against

the underlying General Plan Land Use Designation limit of VMT per service population and Citywide (or Study Area) limit of total daily VMT (**Table 3**).

Table 3: VMT Metrics

Data Set	Description	Purpose
Total Daily VMT	Sum of all daily vehicle miles traveled produced by all uses within the City or applicable Study Area.	Assessing a Project against Citywide or Study Area total limits.
VMT per Service Population	Sum of all vehicle miles traveled produced by uses in the applicable land use designation, divided by the sum of total employees working within the assessed area and dwelling units in the assessed area.	Assessing a Project against land use designation limits.

Fehr & Peers, 2025

2.4.3. VMT Threshold Estimation

The EGSIM20 Travel Demand Model is a tool for implementing the General Plan (i.e., like General Plan policy and actions), like Policy MOB-1-1.

With the development of EGSIM20 and associated calibration and revalidation, the VMT performance measures were re-estimated (compared to the 2019 General Plan thresholds). **Tables 4 and 5** summarize the relevant, current VMT limits at General Plan Buildout (i.e., for the City limits) and VMT by General Plan land use category, respectively, using the VMT calculation methodology outlined in **Attachment A**.

Table 4: Daily VMT Limit by Study Area

City Limit and Study Areas	VMT Limit for Daily Total VMT Generated by the City of Elk Grove Limits
City	8,066,247
North Study Area	27,383
East Study Area	584,786
South Study Area	1,594,674
West Study Area	773,103

Source: Fehr & Peers, 2025

VMT limit is – 85% of average base year VMT per service population by land use

Table 5: Daily VMT Per Service Population by Residential Land Use Category

Land Use Designation	VMT Per Service Population	
	Base Year (2020)	VMT Limit ¹
Commercial and Employment		
Community Commercial (CC)	31.4	26.7
Regional Commercial (RC)	31.7	26.9
Employment Center (EC)	23.8	20.2
Light Industrial/Flex (LI/FX)		15.5
Light Industrial (LI)	26.4	22.4
Heavy Industrial (HI)	31.2	26.5
Mixed Use		
Village Center Mixed Use (VCMU)	–	19.4
Residential Mixed Use (RMU)	–	20.6
Transect		
General Neighborhood Residential (T3–R)	–	20.7
Neighborhood Center Low (T3)	–	21.1
Neighborhood Center Medium (T4)	–	20.2
Neighborhood Center High (T5)	–	15.7
Public/Quasi Public and Open Space		
Parks and Open Space(P/OS)	–	NA ²
Resource Management and Conservations (RMC)	–	NA ²
Public Services (PS)	–	NA ²
Residential		
Rural Residential (RR)	29.6	25.2
Estate Residential (ER)	24.2	20.6
Low Density Residential (LDR)	22.7	19.3
Medium Density Residential (MDR)	21.0	17.9
High Density Residential (HDR)	20.8	17.7
Other		
Agriculture (AG)	–	NA ²

Notes

1 – VMT Limit is 85% of the average base year VMT per service population for parcels with land use designation or VMT per service population at Buildout for land use designation that do not exist in the base year.

2 – These land use designations are not anticipated to produce substantial VMT, as they have no residents and few to not employees.

Source: Fehr & Peers, 2025

2.5. Intersection and Roadway Performance

This study analyzes intersection operating conditions using delay as the primary measure of operational performance, using procedures and methodologies contained in the Highway Capacity Manual, 6th Edition (Transportation Research Board, 2017) as implemented with the Synchro software for the signalized intersections and AASIDRA software for roundabouts. The HCM methodology determines delay at signalized and all-way stop controlled intersections based on the weighted average control delay per vehicle at the intersection. At side-street stop-controlled intersections, the delay is calculated for each movement.

Study roadways were analyzed by comparing daily (two-way total) roadway segment volumes to establish design targets identified in Table 9 of the *City of Elk Grove Transportation Guidelines, July 2023*.

Table 6 and Table 7 summarize the intersection and roadway performance targets, respectively. A Project may be inconsistent with the General Plan if it causes an intersection to operate in excess of the performance target for that intersection type; however, the City may allow deviations from these metrics when accounting for both roadway operations and the effectiveness of the improvements with the character of the surrounding area, the cost to complete the improvement, and ongoing maintenance obligations (General Plan policy MOB-1-3).

Table 6: Intersection Performance Targets

Intersection Control	Delay (Seconds)
Stop (Side-Street & All-Way)	< 35.1
Signal	< 55.1
Roundabout	< 35.1

Source: *Highway Capacity Manual 2016*, Transportation Research Board, 2016.

Table 7: Roadway Segment Performance Targets

Facility Type	Number of Lanes	Median	Speed (mph)	Average Daily Traffic Design Target (No of Vehicles)
Collector/Arterial	2	No	25	13,600
			30	14,600
			35	15,700
			40	16,600
			45	17,700
			55	18,600
		Yes	25	14,300
			30	15,600
			35	16,500
			40	17,500
			45	18,600
			55	19,600
	4	No	30	29,800
			35	31,600
			40	33,500
			45	35,300
	4	Yes	30	31,400
			35	33,300
			40	35,300
			45	37,200
	5	Yes	45	45,600
	6	Yes	30	46,400
			35	48,900
			40	51,500
			45	54,000
	8	Yes	45	64,800
			55	72,000
Expressway	4	Yes	55	64,800
	6	Yes	55	97,200
Freeway	4	Yes	55+	74,400
	6	Yes	55+	111,600
	8	Yes	55+	148,800

Source: City of Elk Grove Transportation Analysis Guidelines (Adopted February 2019/Updated December 2019)

2.6. Multimodal Analysis

The analysis methods evaluate the Project’s potential adverse effects on transportation facilities and services related to bicycles, pedestrians, and transit. Existing and planned facilities near the Project area were identified to determine if the Project could disrupt current facilities and services or interfere with the implementation of planned ones. The analysis methods used to analyze bicycle, pedestrian, and transit facilities are discussed below.

2.6.1. Bicycle Level of Traffic Stress (LTS)

Bicycle LTS refers to the comfort associated with roadways, or the mental ease people experience riding on them. Metrics for bicycling LTS were developed at the Mineta Transportation Institute (MTI) and published in the report “Low-Stress Bicycling and Network Connectivity.”³ The criteria establish a “weakest link” approach, as roadways are classified based on their segments with the highest level of traffic stress, assuming that only those that are comfortable riding under the higher stress would travel on that road. Factors influencing LTS include:

- Number of travel lanes
- Speed of traffic
- Number of vehicles
- Presence of bike lanes
- Width of bike lanes
- Presence of physical barrier

Bicycle riders vary in experience, skill, ability, and confidence. As such, they rely on the bikeway system to cater to their specific needs and abilities. Some cyclists are more comfortable riding in traffic and value bikeways and routes that are direct and limit unnecessary delays. They more comfortably utilize facilities that share the roadway with automobiles or have limited bicycle infrastructure. People with limited bicycling confidence and lower or developing skill levels such as children and older adult riders may desire more separation from traffic to feel comfortable enough to ride. Different bicycle types also require more space in bicycle facilities, such as trailers for children or cargo or adult tricycles. For these reasons, facilities should be designed to accommodate the lowest skill levels, especially in heavily traveled areas.

Recent research has correlated these different bicycle riders with the level of “traffic stress” they are willing to experience while cycling. Bicycle LTS criteria span from 1 to 4, with 1 being the least stressful and 4 being the most stressful. **Table 8** summarizes Pedestrian Streetscore LTS. **Figure 3** shows the different LTS riders in a graphical format.

Fehr & Peers Streetscore+ tool was used to analyze the level of traffic stress for bicyclists.

³ Mekuria, Maaza C., Peter G. Furth, and Hilary Nixon, (2012). *Low-Stress Bicycling and Network Connectivity*. San Jose, California: Mineta Transportation Institute.

Table 8: Bicycle Streetscore LTS

Streetscore LTS	Description
1	Most children and elderly riders can tolerate this level of stress and feel safe and comfortable. LTS 1 roadways typically require more separation from traffic.
2	This is the highest level of stress that the mainstream adult population will tolerate while still feeling safe.
3	Bicyclists who are considered “enthused and confident” but still prefer having their own dedicated space for riding will tolerate this level of stress and feel safe while bicycling.
4	For bicyclists, this is tolerated only by those characterized as “strong and fearless,” which comprises a small percentage of the population. These roadways have high speed limits, multiple travel lanes, limited or non-existent bike lanes and signage, and large distances to cross at intersections.

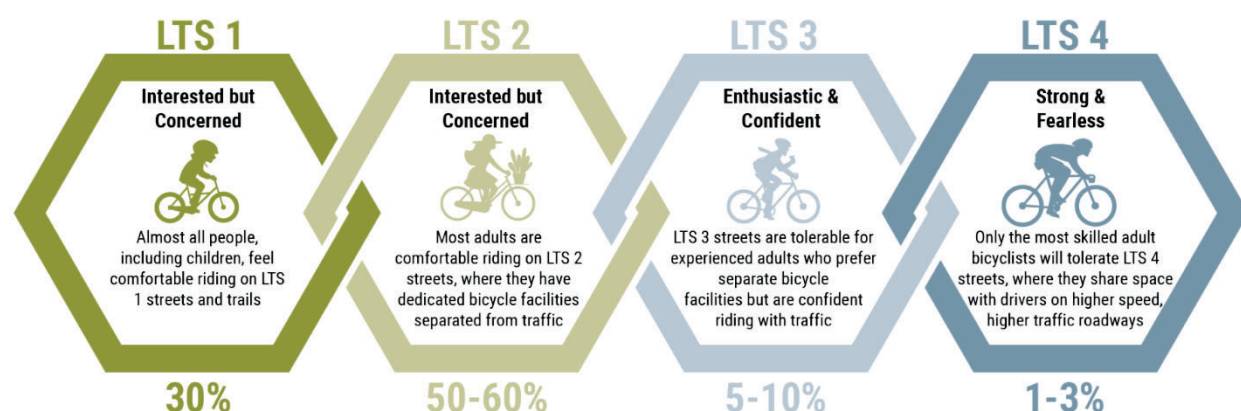


Figure 3: Bicycle Level of Traffic Stress (LTS)

2.6.2. Pedestrian LTS

The Pedestrian LTS refers to the pedestrian comfort associated with a roadway or intersection. The Pedestrian LTS methodology builds on Mekuria, Furth, and Nixon’s 2012 *Low Stress Bicycling and Network Connectivity* report and LTS methodology with a corresponding index for pedestrian comfort. A tool to evaluate Pedestrian and Bicycle LTS called Streetscore+ was developed by Fehr & Peers and includes recommended parameters for the pedestrian environment provided by the NACTO Urban Streets Design Guide (USDG) and additional considerations of comfort informed by practitioner and best practice experience. Roadway segments and intersection approaches receive individual scores based on different considerations. The following factors are considered in developing the Pedestrian Streetscore+ for roadways and intersections:

<u>Roadways</u>	<u>Intersections</u>
Usable sidewalk space	Crossing distance
Driveways	Accessibility
Pedestrian-scale lighting	Channelized right-turns
Street trees and landscaping	Leading pedestrian intervals (LPIs) and pedestrian
Speed	scrambles
Sidewalk quality	
Number of travel lanes	
Heavy vehicle volumes	
Crosswalk frequency	

The Pedestrian Streetscore LTS uses a scale that ranges from 1 to 4, with 1 being the least stressful and 4. **Table 9** summarizes Pedestrian Streetscore LTS.

Table 9: Pedestrian Streetscore LTS

Streetscore LTS	Description
1	Highly comfortable, pedestrian-friendly, and easily navigable for pedestrians of all ages and abilities, including seniors or school-aged children walking unaccompanied to school. These streets provide an ideal “pedestrian-friendly” environment.
2	Generally comfortable for many pedestrians, but parents may not feel comfortable with children walking alone. Seniors may have concerns about the walking environment and take more caution. These streets may be part of a “pedestrian-friendly” environment where it intersects with a more auto-oriented roadway or other environmental constraints.
3	Walking is uncomfortable but possible. Minimum sidewalk and crossing facilities may be present, but barriers are also present that make the walking experience uninviting and uncomfortable.
4	Walking is a barrier and is very uncomfortable or even impossible. Streets have limited or no accommodation for pedestrians and are inhospitable and possibly unsafe environment for pedestrians

Fehr & Peers Streetscore+ tool was used to analyze the level of traffic stress for bicyclists.

2.6.3. Transit Analysis

This analysis focused on evaluation of the Project’s potential adverse effects on transportation facilities and services related to transit facilities. The evaluation could include identification of any disruption to existing facilities and services or interference with the implementation of planned facilities and services or create demand for public transit service above the crush load capacity that is provided or planned.

3. VMT Analysis

This chapter presents analysis of Project vehicle miles traveled (VMT), relative to the current VMT limits and VMT by General Plan land use category presented in **Tables 4 and 5** above.

3.1. VMT Screening

The proposed Project does not qualify for VMT screening due to the Project size, location, and inconsistency with the General Plan land uses (i.e., type and intensity). The Project therefore triggers a need for VMT analysis.

3.2. VMT by General Plan Land Use Category

Project’s VMT per service population was estimated by adding the Project to the cumulative GP Buildout scenario using the methodology described in the previous section. **Table 10** summarizes the Projects VMT per service population for proposed land use. The Project exceeds the VMT limit due to its location and lack of proximity to destinations.

Table 10: VMT Performance by Land Use

Land Use Designation	VMT per Service Population for Low Density Residential
VMT Limit	19.3
Summer Villas Project	20.7
Comparison	+7.3%

Notes:
Calculated Using EGSIM20
VMT limit is – 85% of average base year VMT per service population by land use
Source: Fehr & Peers, 2025

3.3. VMT by Study Area Limits

In addition, the City of Elk Grove uses VMT performance targets by General Plan land use category and VMT limits for the City and study areas, which is an additional step to ensure consistency with the General Plan. **Table 11** summarizes the total daily VMT generated by the City Limits with and without the proposed Project.

Table 11: VMT Performance by Study Area

Land Use Designation	Daily Total VMT Generated by the City of Elk Grove Limits
VMT Limit	8,066,247
VMT with Summer Villas Project	8,071,967
Comparison	+0.07%

Notes:

Calculated Using EGSIM20

VMT limit is – Total Daily VMT generated by City of Elk Grove Boundary as per the most recent version of the General Plan Land Use designations from October 2023

Source: Fehr & Peers, 2025

4. Intersection and Roadway Performance

This chapter presents analysis of intersection and roadway performance under existing and General Plan Buildout conditions, relative to the performance standards in **Tables 8 and 9** presented in Chapter 2.

4.1. Existing & Planned Transportation System

4.1.1. Regional Roadways

State Route 99 (SR-99) is a major interstate freeway corridor that connects major cities within Sacramento County and beyond. The closest interchange to the Project site is the Sheldon Road interchange, which is approximately 2.5 miles to the west.

4.1.2. Local Roadways

Key local study area roadways area is listed below. The functional classifications (e.g., arterial, collector, etc.) of listed local roadways represent designations identified in the Elk Grove General Plan. The number of lanes and posted speed limits of these roadways were obtained from Google Street view and their average daily traffic (ADT) volume were from the City of Elk Grove GIS open data portal showing traffic volumes⁴ or from City of Sacramento traffic count repository.

Sheldon Road is an east–west roadway that extends from Grant Line Road at the eastern part of City of Elk Grove to Bruceville Road to the west. The Project proposes three access locations along Sheldon Road between Waterman Road and Valerie Way. However, the project access review in Chapter 8 recommends that the westernmost access on Sheldon Road should be relocated to Waterman Road, about 600 feet south of Sheldon Road. The intersection of Sheldon Road/Waterman Road has recently been improved to a roundabout with at grade bicycle and pedestrian crossings. Sheldon Road is subject to the Elk Grove Rural Road Improvement Policy.

Lane Configuration: Sheldon Road is a four-lane arterial between Bruceville Road and Jocelyn Way/Luis Stein Road to six lanes between Jocelyn Way/Luis Stein Road and Power Inn Road. The road then goes down to four lanes until Elk Grove Florin Road and finally continues as two-lane roadway up to Grant Line Road.

ADT Volume: ADT on Sheldon Road between Waterman Road and Bradshaw Road is 11,100, between Elk Grove Florin Road and Waterman Road is 13,800 and between Lewis Stein Road and SR 99 is 31,350.

Speed Limit: The posted speed limit is 40 mph on Sheldon Road near the Project site. This posted speed limit continues beyond the Project site both east and west.

Waterman Road is a north–south roadway that extends north of Vintage Park Drive in the Sacramento County to Grant Line Road in the City of Elk Grove. The Project proposes one

⁴ City of Elk Grove GIS open data portal, as of 05/06/25
<https://elkmap.maps.arcgis.com/apps/webappviewer/index.html?id=c2f492ab24e94a17820c163753b48e69>

access along Waterman Road between Sheldon Road and Crowell Drive. However, the project access review in Chapter 8 recommends that the westernmost access on Sheldon Road should be relocated to Waterman Road, 600 feet south of Sheldon Road. The segment of Waterman Road located half mile north and south of Sheldon Road are subject to the Elk Grove Rural Road Improvement Policy.

Lane Configuration: Waterman Road is generally a two-lane arterial throughout its length.

ADT Volume: ADT on Waterman Road between Calvin Road and Sheldon Road is 11,100, between Sheldon Road and Bond road is 12,470 and south of Bond road is 10,300.

Speed Limit: The posted speed limit on Waterman Road is 45 mph.

Bradshaw Road is a north-south arterial less than half a mile east of the Project, extending from Folsom Boulevard in Sacramento County to Grant Line Road in Elk Grove.

Lane Configuration: Bradshaw Road is generally a two-lane roadway.

ADT Volume: ADT on Bradshaw Road between Calvin Road and Sheldon Road is 19,500, between Sheldon Road and Bond road is 16,100, and south of Bond road is 12,400.

Speed Limit: The posted speed limit on Bradshaw Road is 45 mph.

Elk Grove Florin Road is a north-south arterial extending from Florin Road in Sacramento County to East Stockton Boulevard in Elk Grove. North of Florin Road, Elk Grove Florin continues as South Watt Avenue and provides regional connection to the City of Sacramento.

Lane Configuration: Elk Grove Florin Road is generally a four-lane roadway between Florin Road and Gerber Road. South of Gerber, it varies between five and then six lanes until Sheldon Road. South of Sheldon, it continues as four lanes up to Bond Road and then finally continues as two lanes,

ADT Volume: ADT on Elk Grove Florin Road between Calvin Road and Sheldon Road is 26,700, between Sheldon Road and Bond road is 22,800, and South of Bond road is 20,700.

Speed Limit: The posted speed limit on Elk Grove Florin Road is 45 mph.

Calvin Road is an east-west major arterial extending from SR 99 to Grant Line Road and forms the City's northern edge. West of SR99, Calvin road continues as Consumnes River Boulevard and connects to Interstate 5. Calvin Road is at the border of the City. The Project is located one mile south of the road.

Lane Configuration: Calvin Road is six lanes from Power Inn Road to Cliffcrest Drive, transitions to four lanes from Cliffcrest Drive to Vintage Park Drive, and then to five lanes between Vintage Park Drive and Elk Grove-Florin Road.

ADT Volume: ADT on Calvin Road between Waterman Road and Bradshaw Road is 19,000 and between Elk Grove Florin and Waterman is 29,520 (August and September 2019).

Speed Limit: The posted speed limit of Calvin Road is 45 mph.

Bond Road is an east-west roadway that extends from SR 99 to Grant Line Road. West of SR 99, Bond Road continues as Laguna Boulevard and connects to Interstate 5. The Project is located half a mile north of the Road.

Lane Configuration: Bond Road is four lanes between E. Stockton Boulevard to Bradshaw Road. East of Bradshaw Road, Bond Road is two lanes. Bond Road east of Bradshaw Road is subject to the Elk Grove Rural Road Improvement Policy.

ADT Volume: ADT on Bond Road between E Stockton Boulevard and Elk Grove Florin Road is 28,500 between Elk Grove Florin Road and Waterman road is 20,800, between Waterman Road and Bradshaw Road is 17,300 and east of Waterman road is 8,700.

Speed Limit: The posted speed limit on the roadway west of Bradshaw is 45 mph and 40 mph east of Bradshaw.

4.1.3. Collision History

This section analyzes collision data from January 1, 2020 to December 31, 2024, obtained from Transportation Injury Mapping System (TIMS) developed by Safe Transportation Research and Education Center, UC Berkeley⁵ (2023 – 2024 is provisional and subject to change). Data used in TIMS is from California Statewide Integrated Traffic Records System (SWITRS). **Figure 4** illustrates collisions by severity and calls out all bike and pedestrian collisions that resulted in fatalities.

For the analysis, collisions within approximately 1 mile of the Project were analyzed. **Figure 4** shows the study area is shown and collision by severity. These include collisions in Elk Grove. The study area was finalized such that it included all key roadways near the Project site.

Table 12 shows the number of collisions in the study area and their location by year. A total of 205 collisions were reported in the analysis period of which around 34 percent occurred at intersections and 66 percent occurred mid-block. Further, total 17 collisions involved pedestrians or bicyclists. Of these, one collision involving pedestrians resulted in fatalities. The fatal collision took place on Sheldon Road 1355 ft west of the Bradshaw Road intersection. It was due to pedestrian code violation with poor lighting condition (Dark– no streetlight).

⁵ <https://tims.berkeley.edu/>

The dataset between January 1, 2023 and September 30, 2024 is considered provisional and therefore may change.

Table 12: Collision History Within ½ Mile of the Project

Year	Total Collisions	Location		Involved Party	
		Intersection	Mid-Block	Pedestrian	Bicycle
2020	45	26	19	2	0
2021	41	26	15	1	2
2022	40	25	15	3	2
2023	45	33	12	1	1
2024	34	26	8	5	0
All	205	136	69	12	5

Sources: SWITRS 2025, TIMS 2025, Fehr & Peers, 2025

Collisions that result in some injuries are categorized into the following four degrees of severity:

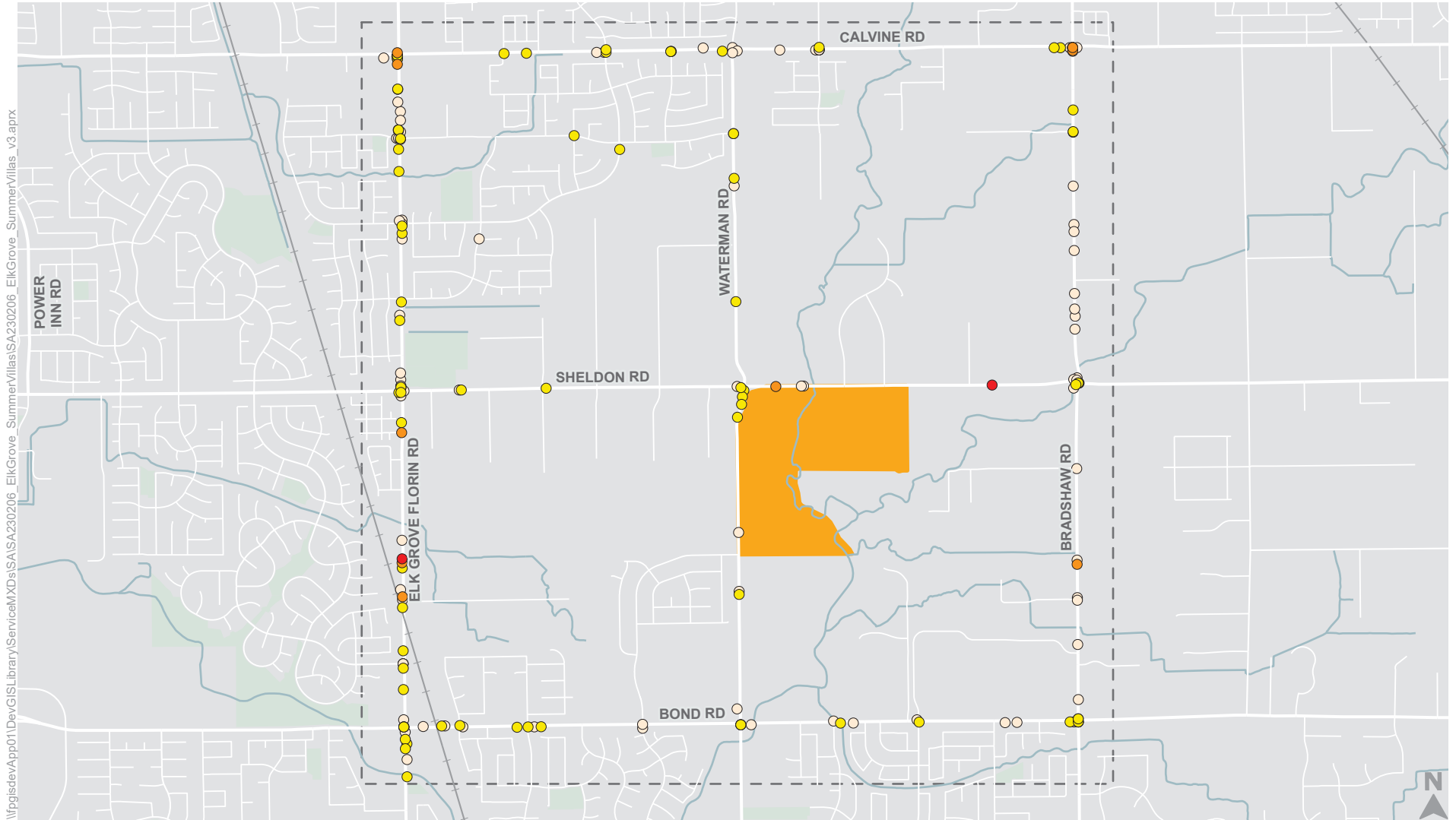
Fatal
Severe Injury
Visible Injury
Injury.

Table 13 describes this data by year of collision for the study area. Around 4 percent of total collisions were identified as KSI (Fatal and Severe Injury) collisions. 30 percent of total collisions resulted in visible injuries and 66 percent resulted in minor injuries. The 2nd fatal collision involved a motor cyclist and took place on Sheldon Road, 1,355ft west of Sheldon Road/Bradshaw Road intersection.

Table 13: Collision by Severity

Year	Total Collisions	Severity			
		Fatal	Severe Injury	Visible Injury	Injury (Complaint of Pain)
2020	45	0	3	14	28
2021	41	0	2	12	27
2022	40	1	0	19	20
2023	45	1	2	15	27
2024	34	0	2	13	19
All	205	2	9	73	121

Sources: SWITRS 2025, TIMS 2025, Fehr & Peers, 2025



Project Boundary

Collisions by Severity 2020 - 2024

- Fatal
- Injury (Severe)
- Injury (Other Visible)
- Complaint of Pain

Collision Boundary

Figure 4

Collisions by Severity



4.2. Traffic Operations

Turning Movement Counts (TMCs) were collected at the five study intersections on Tuesday, August 20, 2024 from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM. Counts were recorded for each 15-minute increment during those periods, and the peak hour was defined as the four consecutive 15-minute periods with the greatest total vehicle volume. The AM and PM peak hours for each intersection are listed below.

Waterman Rd/Sheldon Road: 7:30 AM – 8:30 AM and 4:00 PM – 5:00 PM
Waterman Road/Calvine Road: 7:30 AM – 8:30 AM and 4:00 PM – 5:00 PM
Waterman Road/Bond Road: 7:30 AM – 8:30 AM and 5:00 PM – 6:00 PM
Elk Grove Florin Road/Sheldon Road: 7:45 AM – 8:45 AM and 4:45 PM – 5:45 PM
Bradshaw Road/Sheldon Road: 7:30 AM – 8:30 AM and 4:00 PM – 5:00 PM

Detailed TMC count sheets with vehicle, bike, and pedestrian volumes can be found in **Appendix A**.

Under General Plan buildout conditions, roadways are assumed to be built to their ultimate as per the City of Elk Grove General Plan. All signalized intersections are assumed to have standard lane configuration as per the City of Elk Grove design guidelines. This assumes a minimum of two left-turn pockets, two through lanes, and one right-turn pocket. Intersection turning movement volumes, traffic control, and lane configurations under existing and Buildout Conditions are shown on the following figures:

- Figure 5:** Existing (ENP) Conditions
- Figure 6:** Existing Plus Project (E+P) Conditions
- Figure 7:** Existing Plus Approved Projects (E+AP) Conditions
- Figure 8:** Existing Plus Approved Projects Plus Project (E+AP+P) Conditions
- Figure 9:** General Plan Buildout (CNP) Conditions
- Figure 10:** General Plan Buildout Plus Project (C+P) Conditions

4.2.1. Intersection Operations

Table 14 summarizes intersection performance under all six scenarios with and without the proposed Project. **Appendix B** includes delay reports for intersections for all scenarios.

As shown, under the Existing Plus Project and Existing Approved Project Plus Project conditions, Waterman Road and Sheldon Road will exceed the delay threshold during AM peak hour. Waterman Road and Calvine Road intersection currently exceed the delay target thresholds. The Project increases delay at this intersection.

Under the buildout conditions, the Waterman Road/Sheldon Road intersection, Waterman Road/Calvine Road intersection, and the Bradshaw Road/Sheldon Road intersection all exceed target thresholds. Under the plus project scenario, delay increases at all three intersections. All signal timings were optimized under buildout scenarios. Improvement recommendations to reduce delay are discussed in Chapter 7.

Table 14: Intersection Operations – Existing and Existing Plus Project Conditions

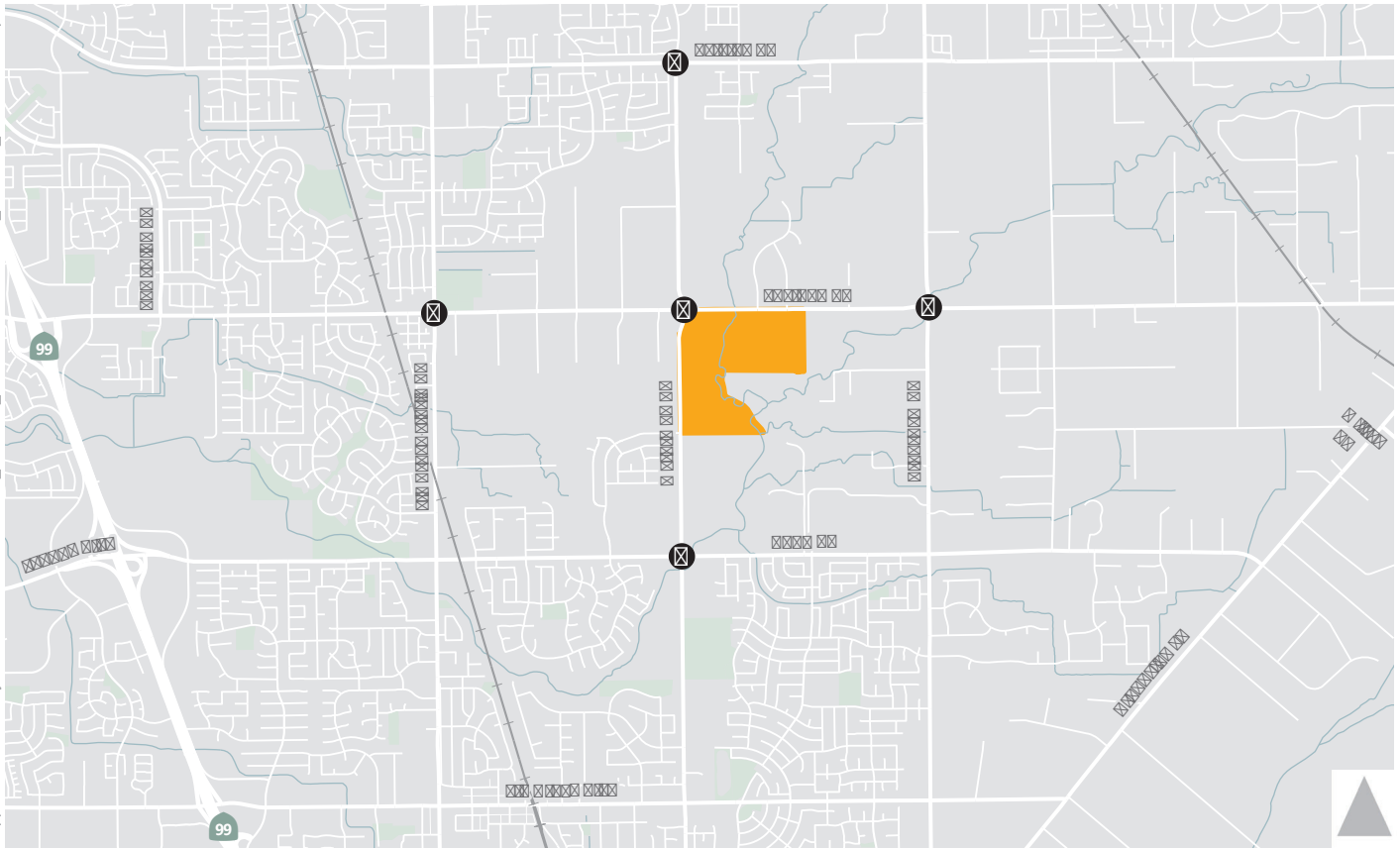
Intersection	Traffic Control	Performance Delay Target	Peak Hour	Delay (seconds)					
				Existing		Near Term	General Plan Buildout		
				ENP	E+P	E+AP	E+AP+P	CNP	C+P
1: Waterman Road/Sheldon Road	Roundabout	< 35.1	AM	23	38	24	40	97	134
			PM	16	20	17	21	64	80
2: Waterman Road/Calvine Road	Signal	< 55.1	AM	73	76	74	76	73	73
			PM	53	54	52	55	49	49
3: Waterman Road/Bond Road	Signal	< 55.1	AM	42	43	43	44	53	54
			PM	31	31	31	31	37	37
4: Elk Grove Florin Road/Sheldon Road	Signal	< 55.1	AM	36	38	37	38	48	52
			PM	37	37	37	38	45	47
5: Bradshaw Road/Sheldon Road	Roundabout	< 35.1	AM	21	23	21	23	66	70
			PM	18	19	19	20	103	108

Notes:

Delay in **Bold** indicates delays that exceed performance targets.

Delays are rounded to the nearest whole number.

Source: Fehr & Peers, 2025



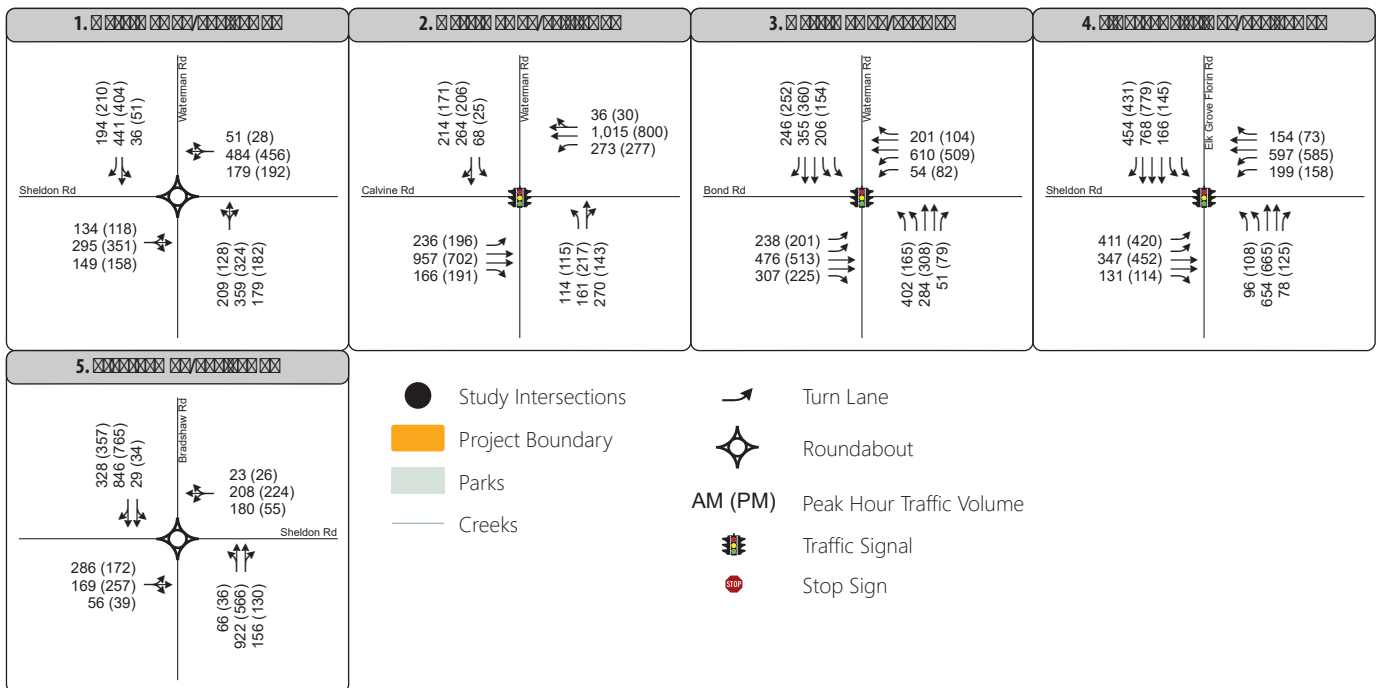
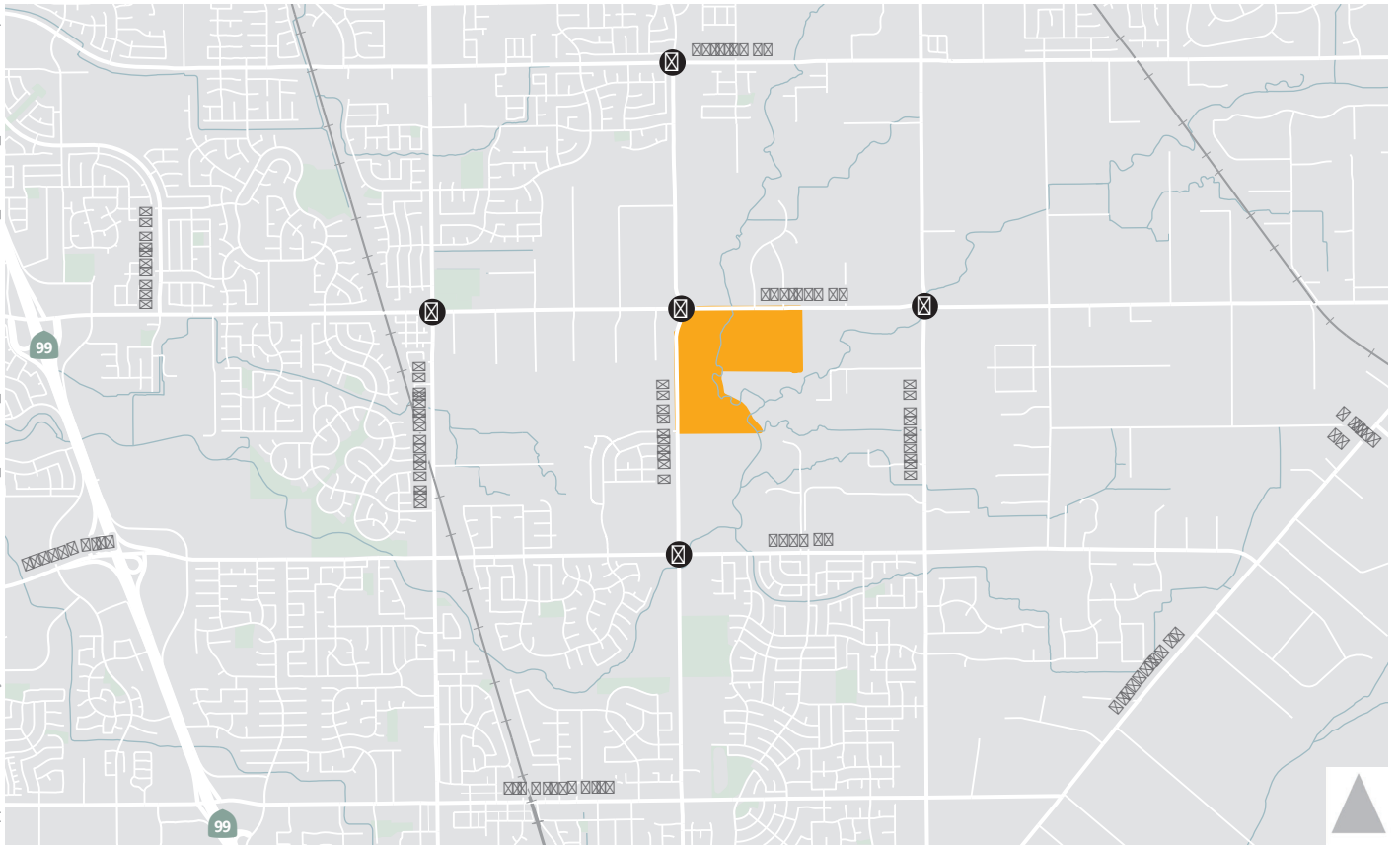


Figure 6

Peak Hour Traffic Volumes
and Lane Configurations -
Existing Plus Project Conditions



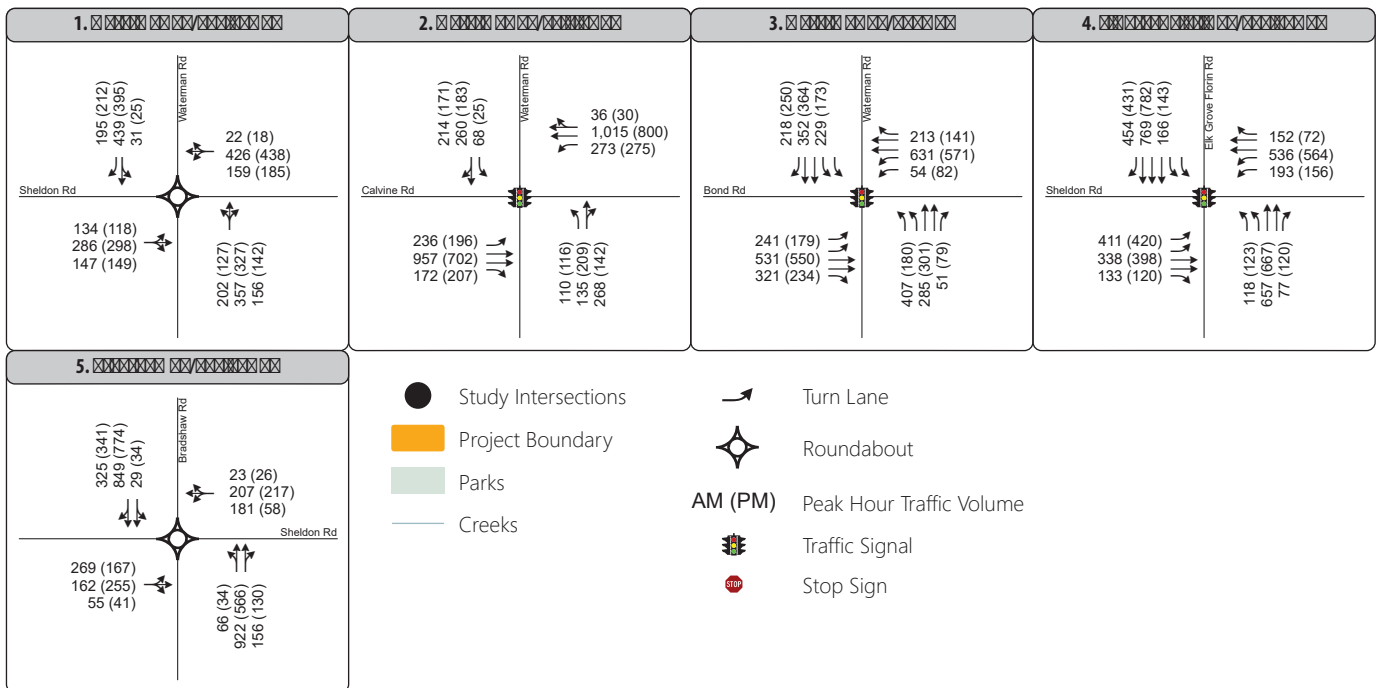
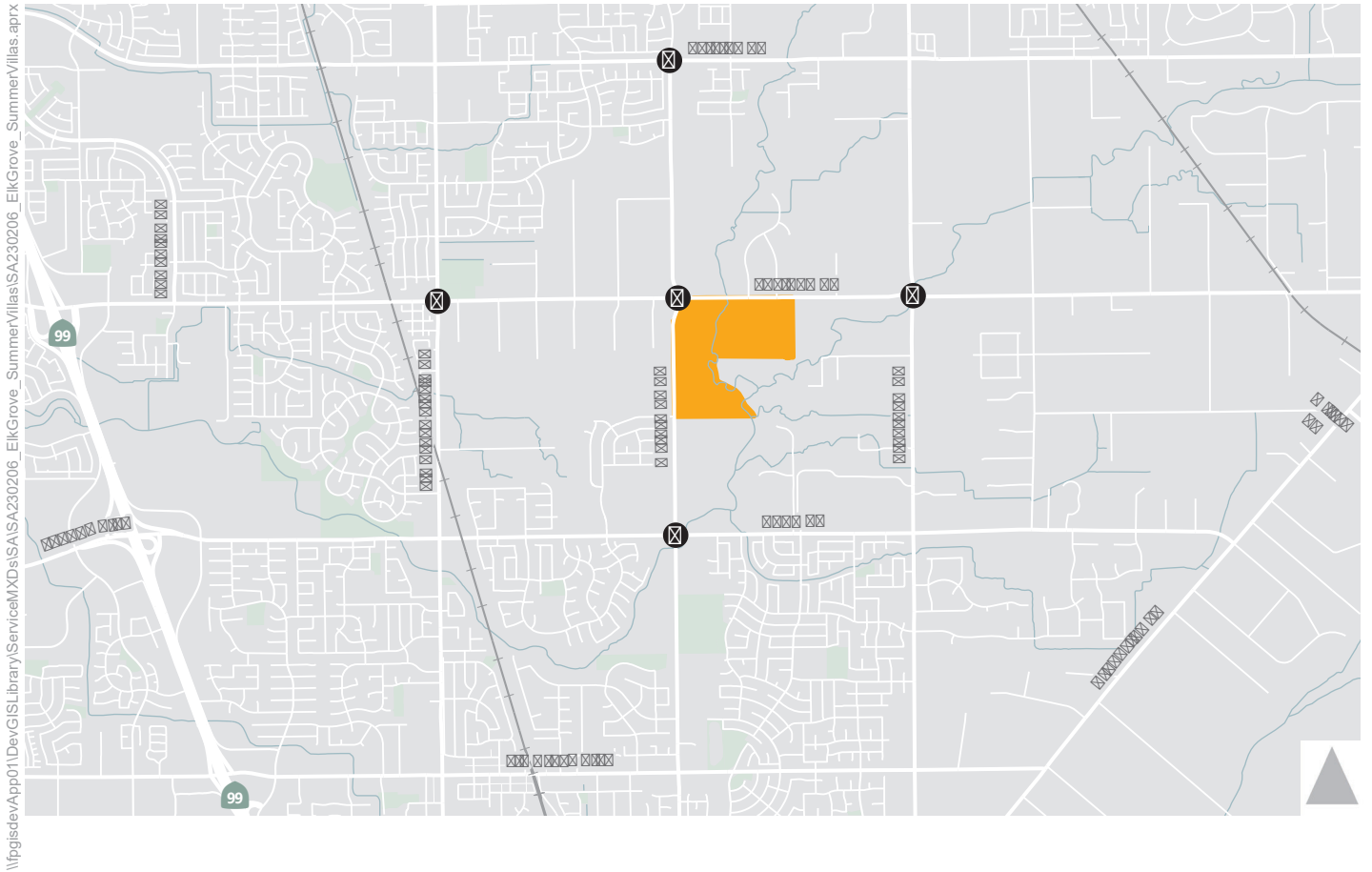


Figure 7

Peak Hour Traffic Volumes and Lane Configurations - Existing Plus Approved Project Conditions



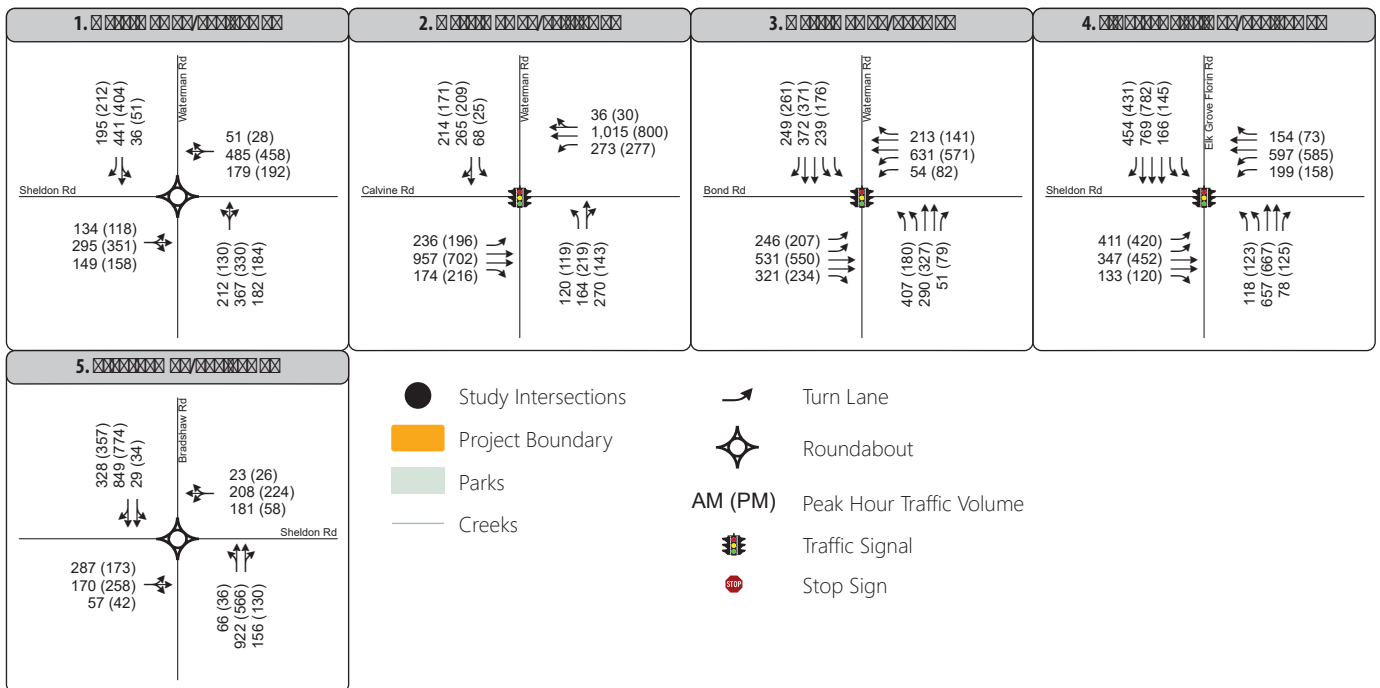
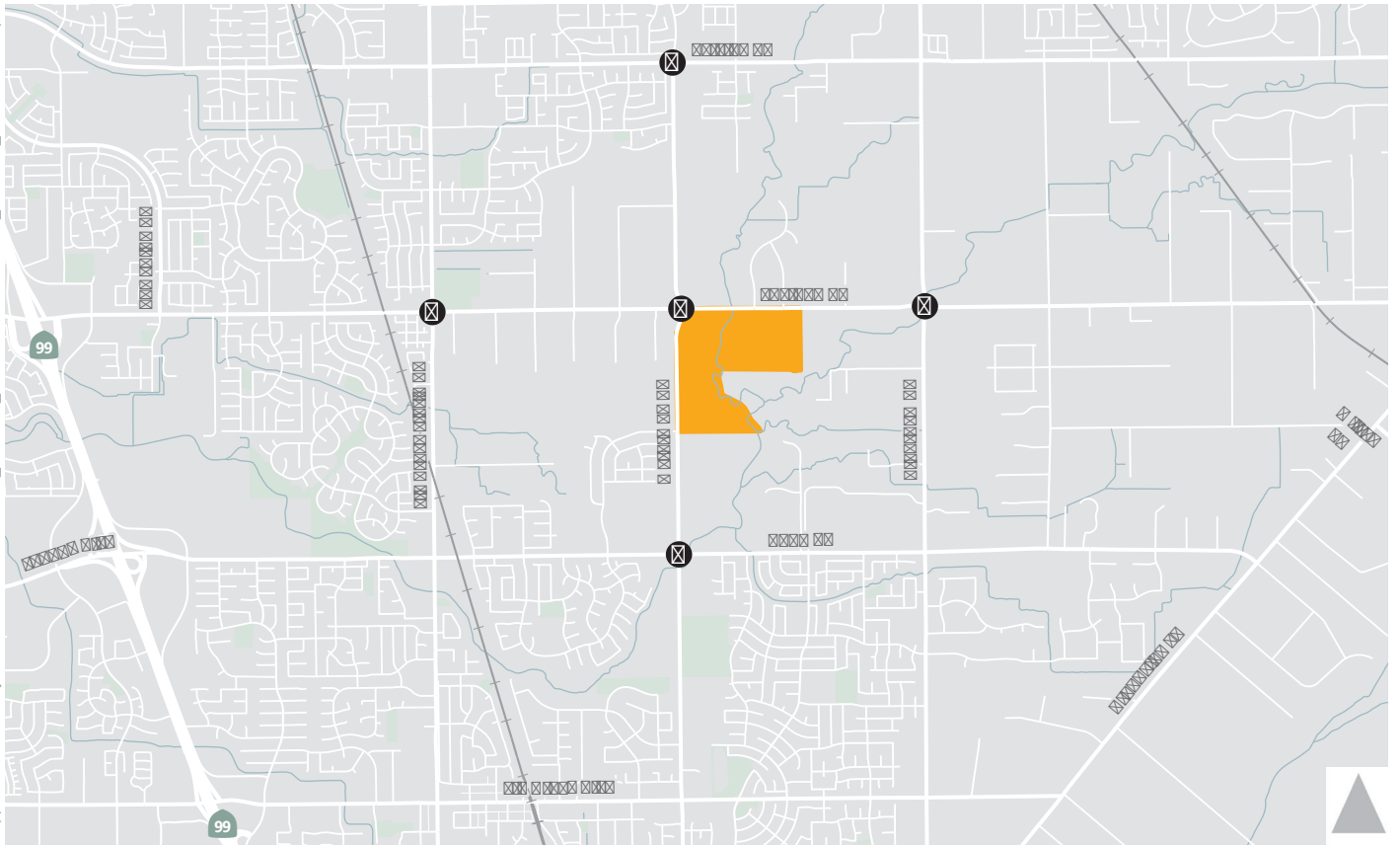


Figure 8

Peak Hour Traffic Volumes and Lane Configurations - Existing Plus Approved Project Plus Project Conditions



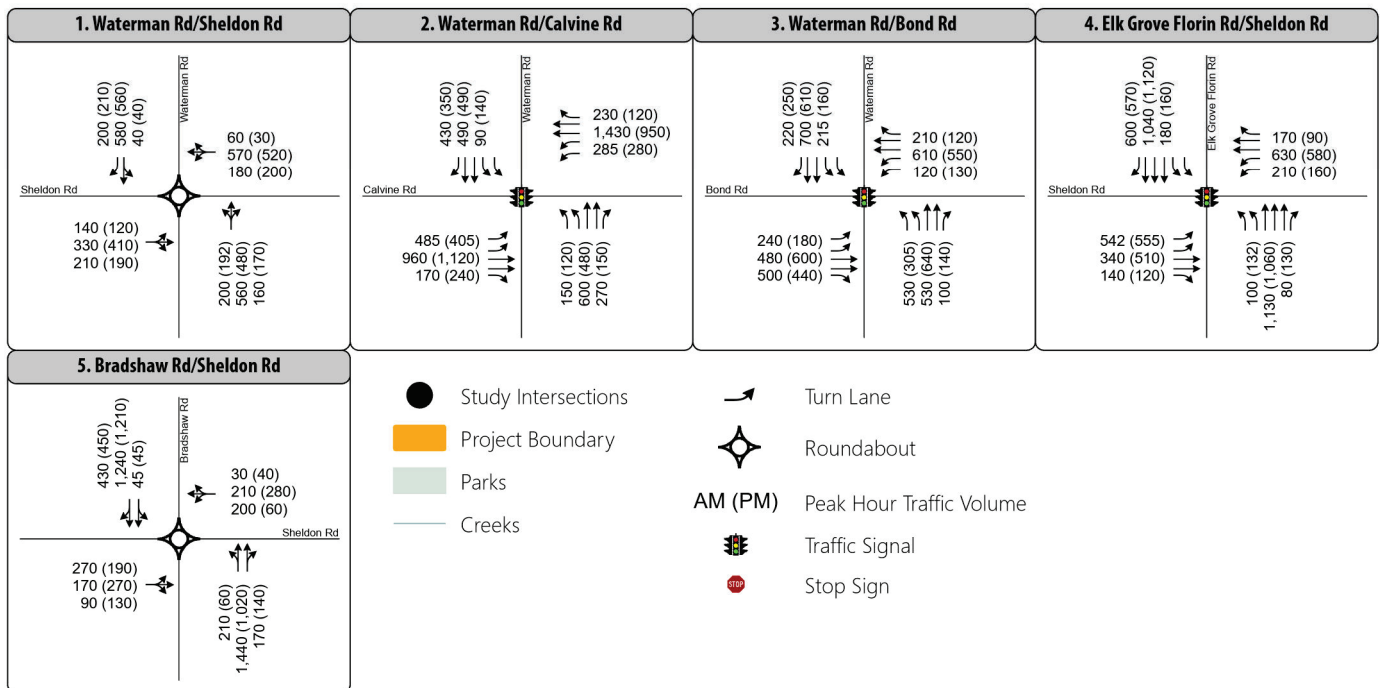
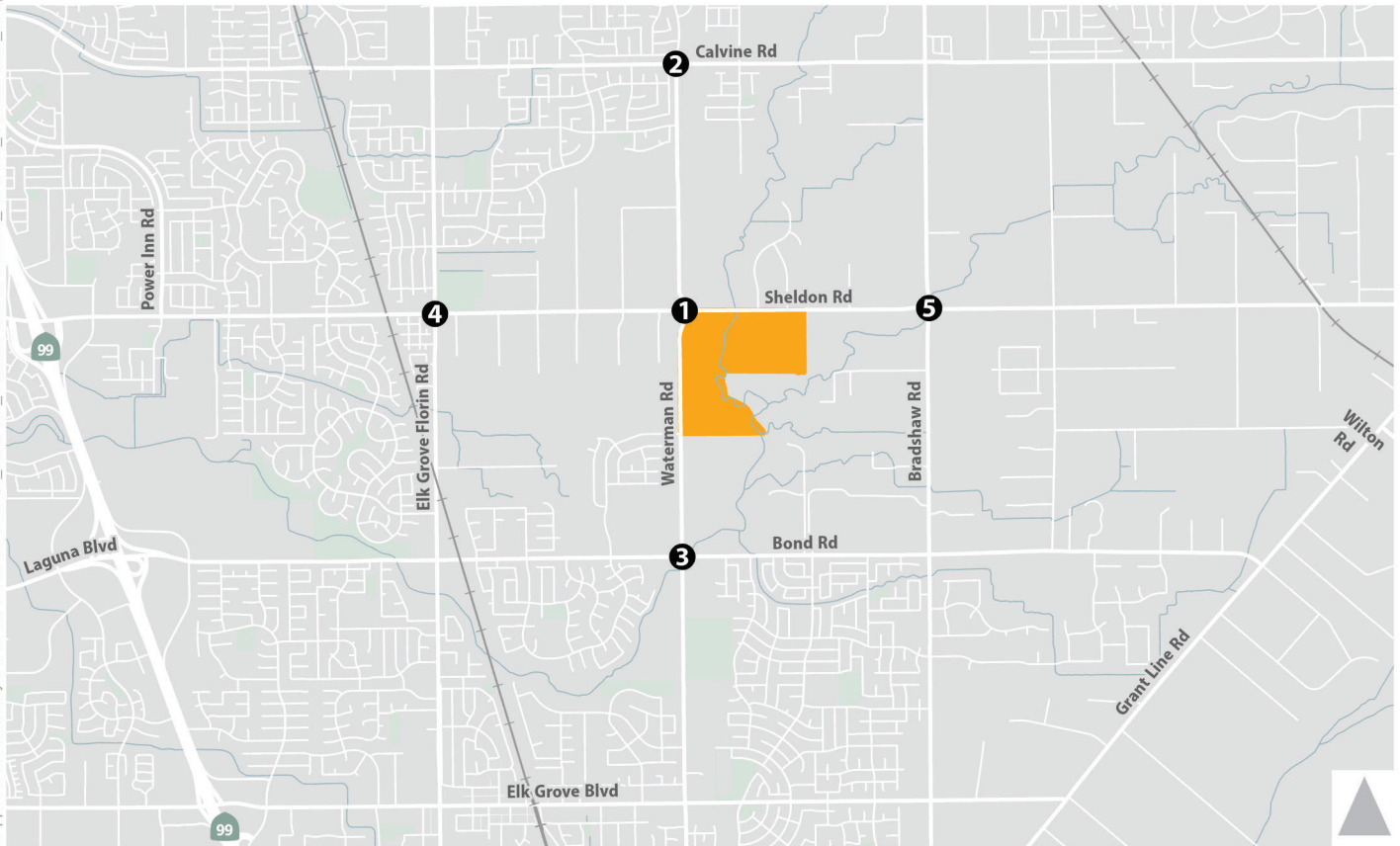


Figure 9

Peak Hour Traffic Volumes
and Lane Configurations -
Cumulative No Project Conditions

*Figure not OCR compatible.



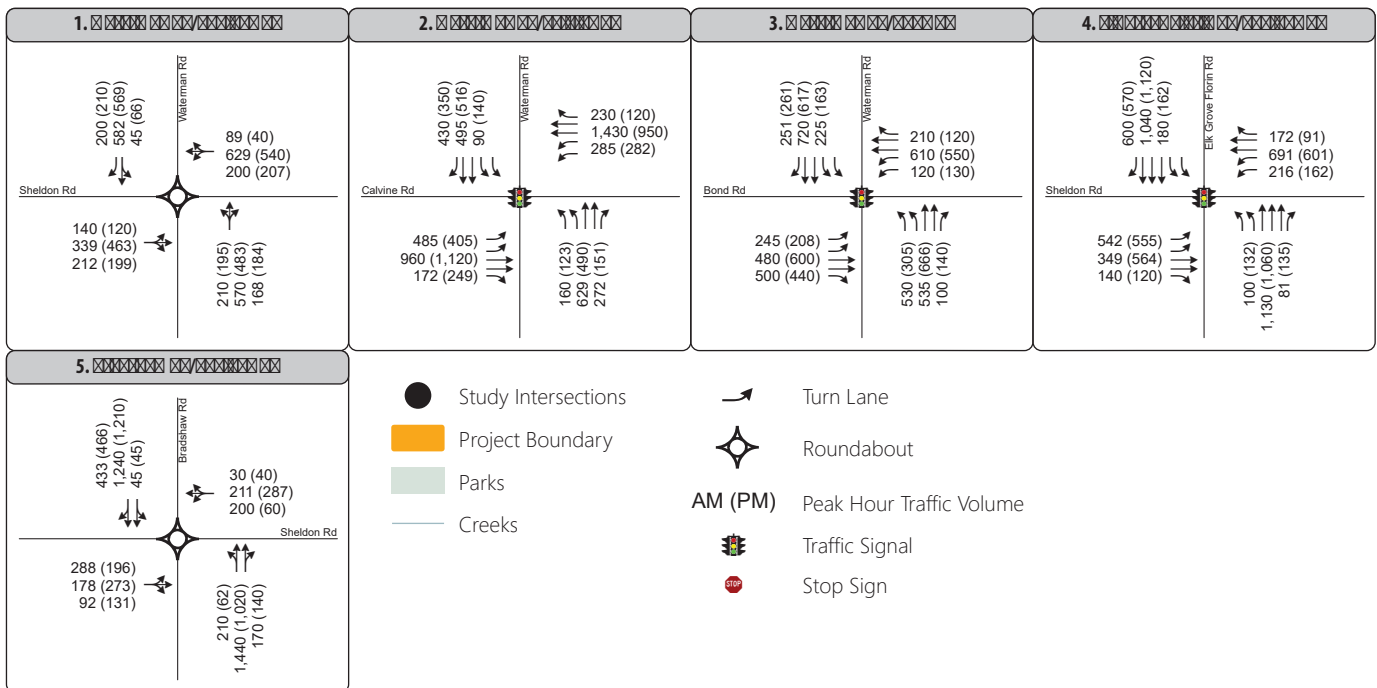
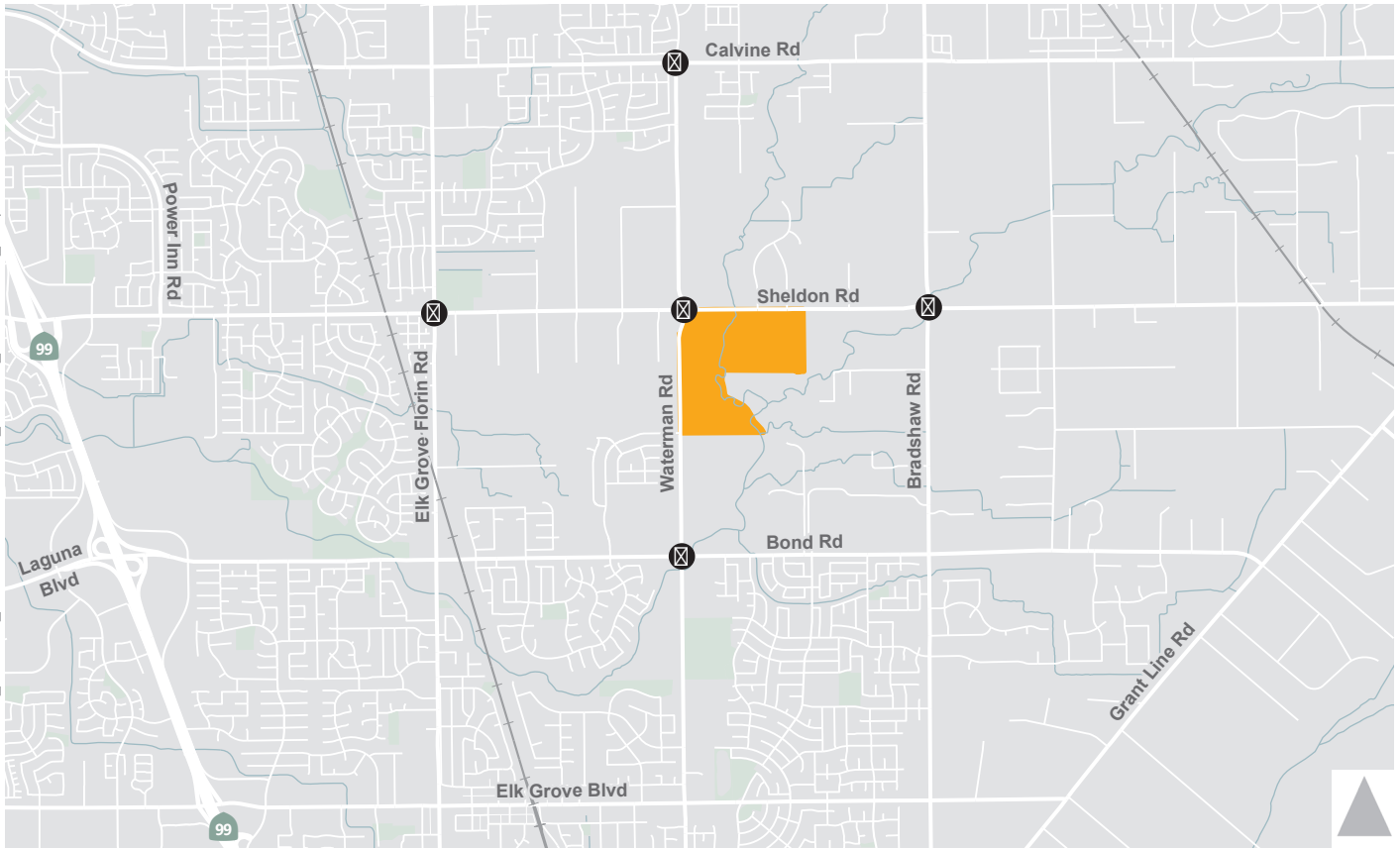


Figure 10

Peak Hour Traffic Volumes and Lane Configurations - Cumulative Plus Project



4.2.2. Roadway Operations

Table 15 summarizes the Average Daily Traffic (ADT) of study roadway segments with or without the Project against the design targets for Existing, Existing Plus Approved Project, and General Plan Buildout scenarios consecutively.

As shown, Sheldon Road from Elk Grove Florin Road to Waterman Road will exceed the design target under General Plan Buildout Plus Project conditions. Waterman Road from Sheldon Road to Bond Road will exceed the design target under General Plan Buildout and General Plan Buildout Plus Project.

Improvement recommendations are discussed in Chapter 7.

Table 15: Daily Roadway Performance

Roadway	Segment	Daily Roadway Volume									
		Existing				Near-Term		General Plan Buildout			
		Lanes	Design Target	ENP	E+P	E+AP	E+AP+P	Lanes	Design Target	CNP	CPP
Sheldon Road	Lewis Stein Road to SR 99	6	51,500	31,350	31,500	31,600	31,600	6	51,500	41,600	41,700
	Elk Grove Florin Road to Waterman Road ¹	2	16,600	13,800	14,900	13,900	14,900	2	16,600	15,800	16,900
	Waterman Road to Bradshaw Road ¹	2	16,600	11,100	11,600	11,200	11,600	2	16,600	13,300	13,700
Elk Grove Florin Road	Calvine Road to Sheldon Road	4	37,200	26,700	26,800	26,900	26,800	6	54,000	44,100	44,100
	Sheldon Road to Bond Road	4	37,200	22,800	22,900	23,300	23,400	4	37,200	34,200	34,300
Waterman Road	Sheldon Road to Bond Road ¹	2	17,700	12,470	13,400	12,800	13,700	2	17,700	19,300	20,300
	Calvine Road to Sheldon Road ¹	2	17,700	11,100	11,800	11,300	11,900	2	17,700	15,700	16,400
	Bond Road to Elk Grove Blvd	2	17,700	10,300	10,400	10,400	10,400	4	37,200	22,400	22,400
Bradshaw Road	Sheldon Road to Bond Road	3	26,500	16,100	16,300	16,200	16,300	4	37,200	27,600	27,700
Calvine Road	Elk Grove Florin Road to Waterman Road	4	37,200	29,520	29,600	29,600	29,500	6	54,000	45,000	45,000
	Waterman Road to Bradshaw Road	5	45,600	19,000	19,400	20,300	20,600	5	45,600	28,800	29,100
Bond Road	E. Stockton Blvd to Emerald Crest Dr	6	54,000	28,500	29,100	31,100	31,600	6	54,000	34,500	35,000
	Elk Grove Florin Road to Waterman Road	4	37,200	20,800	20,900	22,500	22,500	4	37,200	26,100	26,100
	Waterman Road to Bradshaw Road	4	37,200	17,300	17,300	17,300	17,300	4	37,200	21,100	21,100

Notes:

¹The study segments of Sheldon Road are located in Elk Grove's Rural Area and are subject to the Elk Grove Rural Road Improvement Policy. The study segments of Waterman Road a half mile north and south of Sheldon Road are in Elk Grove's Rural Area and are subject to the Elk Grove Rural Road Improvement Policy.

Volumes in **Bold** indicate daily volumes that exceed daily design targets. Volumes are rounded to the nearest 100.

Source: Fehr & Peers, 2025

5. Bicycle/Pedestrian/Transit Facilities and Services

This section discusses the conditions of bicycle and pedestrian facilities and transit service with the addition of the proposed Project.

5.1. Existing & Planned Transportation System

The existing bicycle and pedestrian facilities in the Project vicinity are shown in **Figure 11**.

5.1.1. Bicycle Facilities

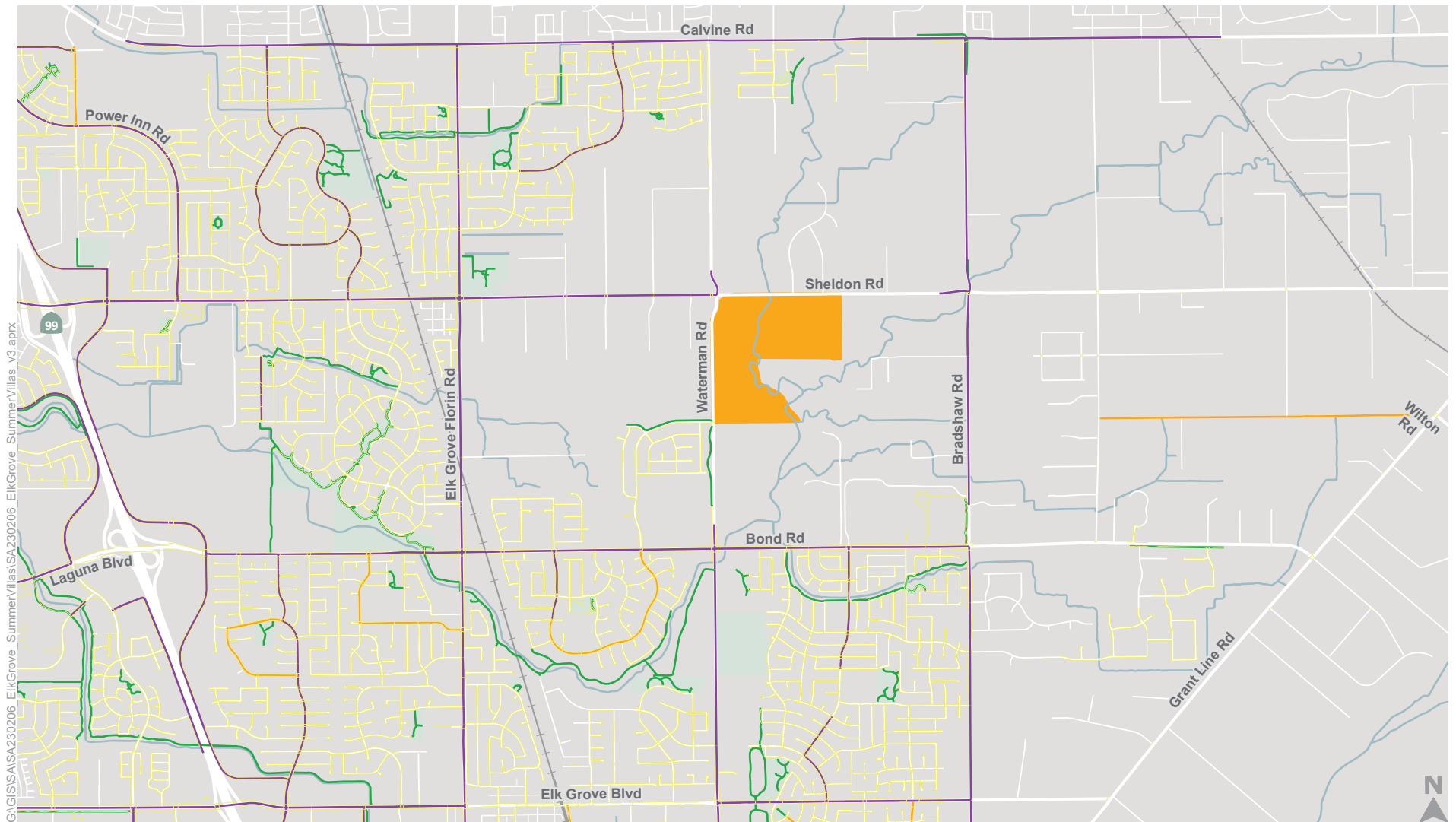
Shoulders are currently striped as Class II Bicycle Lanes along Waterman Road and Sheldon Road to the west of Waterman Road. There is a new multi-use path constructed as part of the sub-division in the southwest corner of the project. Sheldon Road / Waterman Road intersection has recently improved roundabout bicycle crossing. *City of Elk Grove Bicycle, Pedestrian, & Trails Master Plan*, May 2021 (BPTMP)⁶ has the goal to reduce the percent of arterial streets that are Level of Traffic Stress (LTS) 4 from 84 percent to 70 percent by 2040.

The BPTMP and the Rural Road Improvement standards propose Class II Buffered Bicycle lanes along Waterman along the Project frontage and Class I Multi-Use Path along Sheldon Road between Elk Grove Florin Road and Waterman Road. Class I Multi-Use Path is also proposed along the Project frontage parallel to Waterman Road. Rural Road Improvement standard proposes bike lanes along Sheldon Road within the Rural Residential area of the City.

5.1.2. Pedestrian Facilities

In general, sidewalks are not present on Sheldon Road, Waterman Road, or Bradshaw Road. There is a new multi-use path constructed as part of the sub-division in the southwest corner of the project. The City of Elk Grove BPTMP and Rural Road Improvement Standards propose a planned Class I multi use path along Waterman Road that could be used for pedestrian access that will connect to the existing sidewalks on Bond Road and Calvine Road. These connections are dependent upon future Project development. The most immediate connection would be an at-grade crossing at Elliott Springs Drive at the South-West corner of the site to access the existing off-street trails on the north side of Elliott Springs Drive and west side of Waterman Road. This will provide access to Calvine Road and Bond Road. Other improvements are not planned to be implemented in the short-term. However, sidewalks are not planned along either Sheldon Road near the Project site.

⁶ City of Elk Grove Bicycle, Pedestrian, & Trails Master Plan, May, 2021
<https://www.elkgrovecity.org/sites/default/files/city-files/Departments/SPI/BPTMP/May%202021%20Final%20BPTMP%20Plan.pdf>



- Sidewalks
- Existing Class I Multi-Use Path
- Existing Class II Bike Lane
- Existing Class III Bike Route
- Project Boundary
- Parks

Figure 11



Local Roadways with Existing Bicycle and Pedestrian Facilities

5.1.3. Transit Facilities

There are currently no transit facilities within half a mile of the proposed Project. The nearest bus stops are one mile away at Elk Grove–Florin Road / Sheldon Road (West), Bond Road / Waterman Road (South), and Calvine Road / Waterman Road (North). There are four current bus routes operated by Sacramento Regional Transit (SacRT) that serve these three bus stops. **Figure 12** shows transit facilities discussed below.

Route E114 is a local route that provides service between Bradshaw Christian High School and Sheldon High School at Bradshaw Road and Calvine Road. This route serves Cosumnes River College through to the Laguna and Laguna West neighborhoods. This route operates Monday through Friday from approximately 6:00 AM to 8:00 PM and from 7:00 AM to 5:30 pm on Saturdays. Generally, the route runs hourly. The nearest stop is at Calvine Road and Waterman Road one mile north of the Project.

Route E115 is a local route that provides service from Elk Grove Boulevard at Clarke Farms Drive to Cosumnes River College via Bond Road and Sheldon Road. This route runs Monday through Friday from approximately 6:00 AM to 8:00 PM Westbound to Cosumnes River College and 8:30 AM to 9:00 pm Eastbound. The nearest stop is 1-mile west of the Project at Sheldon Road and Elk Grove–Florin Road.

Route E19 is a commuter route that provides service from the Laguna West at Harbour Point Drive to the Butterfield Light Rail Station on Folsom Boulevard. This route runs every hour Monday through Friday from 5:00 AM to 7: AM heading to the Light Rail Station and returning every hour from 3:00 pm to 5:00 pm. The nearest stop is one mile west at Sheldon Road and Elk Grove–Florin Road.

Route E15 is a commuter route that provides service from Bond Road at Bradshaw Road near Katherine Albiani Middle School / Pleasant Grove High School to Downtown Sacramento. This route provides two buses towards Sacramento in the morning at 6:15 AM and 6:45 AM and two buses returning to Elk Grove in the evening at 4:15 PM and 4:45 PM. The nearest stop is one-mile northwest at Bond Road and Elk Grove–Florin Road.

SacRT Flex SacRT has converted their SmaRT Ride program into SacRT Flex program. SmaRT Ride was an on-demand service operated by SacRT similar to ride-share services where customers can use a smartphone app to request a ride that will pick up and drop off passengers within the service boundaries. Due to operation budget issues, this program has been consolidated to the Flex program which will be only available for low income and persons with disability. SacRT Flex will be operated by Via. The Project is within the Elk Grove SacRT Flex zone. This service only operates within its designated zone. SmaRT Ride is available Monday through Friday from 7 AM. to 7 PM.

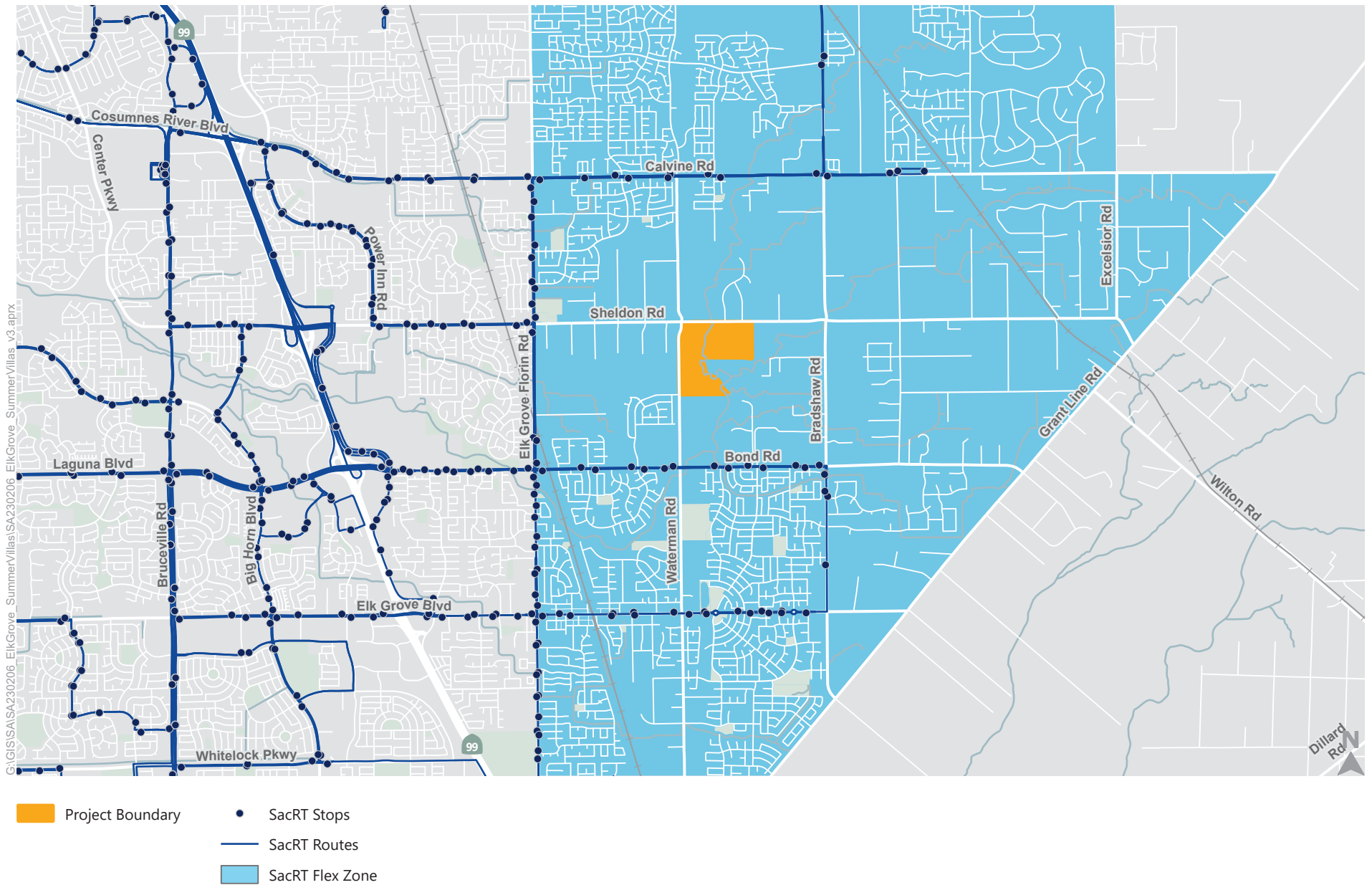


Figure 12



5.2. Multimodal Traffic Level of Stress

5.2.1. Bicycle Streetscore LTS

The BPTMP designates Sheldon Road as a High Level of Stress (LTS 4) along its length. Waterman is designated as LTS 4 north of the Project and LTS 3 along the Project frontage. All approaches at Waterman Road and Sheldon Road intersection are also designated as LTS 4. As shown in **Table 12**, a bicycle collision near the Project site has resulted in fatality in the last 3 years. **Table 16** summarizes Bicycle Streetscore LTS with the addition of the proposed Project on Sheldon Road and Waterman Road. As shown in **Table 16**, the LTS will remain unchanged with the addition of the proposed Project. The LTS score is due primarily to the travel speed and lack of bicycle infrastructure on Sheldon and Waterman Road. The proposed Project does not include accommodation for any off-site bicycle improvements.

Table 16: Bicycle Street Score LTS – Existing Conditions

Roadway	Segment	LTS	
		Existing	Existing With Project
Sheldon Road	Waterman Road to Bradshaw Road	4	4
	Waterman Road to Elk Grove Florin Road	4	4
Waterman Road	Sheldon Road to Calvine Road	4	4
	Sheldon Road to Bond Road	3	3

Source: Fehr & Peers, 2025

5.2.2. Pedestrian Streetscore LTS

Table 19 summarizes Pedestrian Streetscore LTS with the addition of the proposed Project on Sheldon Road and Waterman Road. As shown in **Table 17**, the LTS will remain at LTS 4 with addition of the proposed Project. The LTS score is due primarily to the lack of pedestrian facilities on the study roadways and travel speed. The proposed Project does not include accommodation for any off-site pedestrian improvements.

Table 17: Pedestrian Street Score LTS – Existing Conditions

Roadway	Segment	LTS	
		Existing	Existing With Project
Sheldon Road	Waterman Road to Bradshaw Road	4	4
	Waterman Road to Elk Grove Florin Road	4	4
Waterman Road	Sheldon Road to Calvine Road	4	4
	Sheldon Road to Bond Road	4	4

Source: Fehr & Peers, 2025

6. Impacts and Mitigation Measures

This chapter identifies Project-specific and cumulative impacts of the proposed Project. Impact statements are provided for the topics of VMT and roadway safety, which are the criteria used to evaluate roadway system impacts. Impact statements are also provided for the bicycle, pedestrian, and transit systems. Mitigation measures are recommended for significant impacts.

6.1. Regulatory Background

The following regulations, policy and guidelines are relevant to the transportation analysis.

6.1.1. SB 743

SB 743, passed in 2013, required the California Governor's Office of Planning and Research (OPR) to develop new CEQA guidelines that address traffic metrics under CEQA. As stated in the legislation, upon adoption of the new guidelines, "automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion shall not be considered a significant impact on the environment pursuant to this division, except in locations specifically identified in the guidelines, if any." In December 2018, OPR published *Technical Advisory on Evaluating Transportation Impacts in CEQA* ("Technical Advisory"), which provided guidance for implementing SB 743. On December 28, 2018, the Resources Agency adopted CEQA Guidelines Section 15064.3. Under this guideline, VMT is the primary metric used to identify transportation impacts. On July 1, 2020, the provisions of Section 15064.3 became effective statewide.

6.1.2. City of Elk Grove General Plan

The City of Elk Grove General Plan, amended December 2023, is a fundamental planning document that directs future growth, development, and conservation policy and reflects the long-range vision of the community. The Mobility chapter of the General Plan contains policies designed to further the City's mobility strategy. The Mobility chapter incorporates and expands the City's complete streets policies; supports key implementation tools, such as the Bicycle, Pedestrian, and Trails Master Plan, the Transportation Analysis Guidelines, and the Climate Action Plan; and identifies measures to support alternative transportation investments, as well as transit-friendly and active transportation-friendly development. It should be noted that a Project's effect on automobile delay is no longer a consideration when identifying a significant impact under CEQA.

6.1.3. City of Elk Grove Transportation Analysis Guidelines

Transportation Analysis (TA) Guidelines, updated July 2023, provides guidance regarding the City's preferred methods for conducting transportation analysis. The TA guidelines incorporate various elements of the *Technical Advisory*, OPR, but refinements and clarifications have been added to reflect local conditions. The guidelines also include requirements for multimodal (bicycle, pedestrian, and transit) transportation analysis, hazards related to design, on-site circulation, and construction. Currently, the City is updating its Transportation Analysis Guidelines. Table 9 of the guidelines also establishes design targets for roadway segments based on the daily two-way total volumes.

6.1.4. City of Elk Grove Rural Road Improvement Policy and Standards

The City of Elk Grove Rural Road Policy, updated December 2019, is intended to preserve and maintain the rural roadways in the City's rural residential area. The policy establishes a value-based approach for incremental (rather than ultimate) road improvements that solve specific traffic issues identified through periodic evaluations of traffic conditions. Road improvements within the City's defined rural residential area shall be implemented in response to traffic impacts.

The Rural Road Improvement Standards implement the General Plan goals, policies, and actions. These standards implement the provisions of the Land Use and Circulation Elements regarding the maintenance of features that create the rural character. This document replaces the Citywide Improvement Standards for design details associated with road improvements for the City's designated rural/residential area

6.1.5. City of Elk Grove Bicycle, Pedestrian, and Trails Master Plan

The *City of Elk Grove Bicycle, Pedestrian, and Trails Master Plan* (BPTMP), May 2021 is intended to guide and influence pedestrian, bicycle, and trail policies, programs, and development standards to make biking and walking in the City more safe, comfortable, convenient, and enjoyable for all community members. The goal of the master plan is to increase the number of persons who walk and bicycle for transportation to work, school, and errands and for recreation. The plan identifies existing facilities, opportunities, constraints, destination points for bicycle users and pedestrians, and proposed bicycle and pedestrian improvements.

The Rural Road Improvement Standards implement the General Plan goals, policies, and actions. These standards implement the provisions of the Land Use and Circulation Elements regarding the maintenance of features that create the rural character. This document replaces the Citywide Improvement Standards for design details associated with road improvements for the City's designated rural/residential area.

6.2. Thresholds of Significance

The following thresholds of significance are used to evaluate the significance of Project impacts to the roadway, bicycle, pedestrian, and transit systems. The significance criteria used to evaluate Project impacts on transportation under CEQA are based on Appendix G of the State CEQA Guidelines, as well as thresholds of significance adopted in the City General Plan and the City Transportation Analysis Guidelines. The following describes the significance criteria used to identify impacts on the transportation for the proposed Project.

6.2.1. VMT

City of Elk Grove, as a part of the 2023 General Plan update, has developed a City of Elk Grove travel demand model (EGSIM20). EGSIM20 is a modified version of the latest ABM developed by Sacramento Area Council of Governments (SACOG) known as SACSIM19. With the development of EGSIM20 and associated calibration and revalidation, the VMT performance measures were re-estimated to provide a consistent basis of evaluating the Project, a key requirement of SB 743, to ensure that the effects of the Project are accurately identified.

Land Use Limits – Sum of all vehicle miles traveled produced by uses in the applicable land use designation, divided by the sum of total employees working within the assessed area and dwelling units in the assessed area. An impact on VMT would be significant if implementation of the Project would result in an exceedance of the VMT limits of the Project's following General Plan land use designations, which incorporate a 15 percent reduction for existing (i.e., 2020) condition:

Low Density Residential – 19.3 daily VMT per service population

Study Area Limits – Sum of all daily vehicle miles traveled produced by all uses within the City or applicable Study Area. An impact on VMT would be significant if implementation of the Project would result in an exceedance of the established 8,066,247 total daily VMT within the City Limits.

6.2.2. Bicycle Facilities

An impact would be significant if implementation of the Project would:

- Disrupt existing or planned bicycle facilities or conflicts with adopted City non-auto plans, guidelines, policies, or standards.
- Add trips to an existing transportation facility or service (e.g., bike path) that does not meet current design standards.
- Degrade the Bicycle Streetscore LTS.

6.2.3. Pedestrian Facilities

An impact would be significant if implementation of the Project would:

- Fail to provide accessible and safe pedestrian connections between buildings and adjacent streets and transit facilities.
- Disrupt existing or planned bicycle facilities or conflicts with adopted City non-auto plans, guidelines, policies, or standards.
- Add trips to an existing transportation facility or service (e.g., sidewalk) that does not meet current design standards.
- Degrade the Pedestrian Streetscore LTS.

6.2.4. Transit service and facilities

An impact would be significant if implementation of the Project would:

- Create demand for public transit service above the crush load capacity that is provided or planned.
- Disrupt existing or planned transit facilities and services or conflicts with adopted City non-auto plans, guidelines, policies, or standards.

6.2.5. Transportation Hazards Related to Geometric Design Feature or Incompatible Uses

An impact would be significant if implementation of the Project would:

Result in designs for on-site circulation, access, and parking areas that fail to meet City or industry standard design guidelines.

6.2.6. Emergency Access

An impact would be significant if implementation of the Project would:

Result in inadequate emergency access.

6.3. Project Specific Impacts

6.3.1. Impact 1: VMT – Land Use Limits

The Project's VMT performance was analyzed in a comprehensive manner that considered its relative VMT efficiency per service population. **Table 10** shows VMT per service population for the low-density residential Project, which exceeds the VMT limit by 7.3 percent.

Therefore, the Project's residential land use VMT performance would be considered **significant**.

6.3.2. Impact 2: VMT – Study Area Limits

Table 11 shows the total daily VMT generated by the City of Elk Grove with the Project exceeds the General Plan Buildout VMT limit by 0.07 percent.

Therefore, the Project's Study Area VMT performance would be considered **significant**.

Mitigation Measures 1 & 2: VMT Reduction Strategies

The Project applicant shall implement VMT reduction strategies to reduce the VMT per service population of the Project's residential land use components.

The City of Elk Grove Transportation Analysis Guidelines identifies the following five categories of VMT reductions:

- Category A – Land Use/Location
- Category B – Site Enhancement
- Category C – Transit System Improvements
- Category D – Commute Trip Reductions
- Category E – In-Lieu Fee

CATEGORY A: LAND USE/LOCATION

Increase Residential Density (CAPCOA Handbook Strategy T-1) – This measure accounts for the VMT reduction achieved by a Project that is designed with a higher density of dwelling units compared to the average residential density in the United States (9.1 dwelling units/acre). Increased densities affect the distance people travel and provide greater options for the mode of travel they choose. Increasing residential density results in shorter and fewer trips by single-occupancy vehicles. This measure is best quantified when applied to larger developments and developments where the

density is somewhat similar to the surrounding area due to the underlying research being founded in data from the neighborhood level.

The proposed Project will have a density of approximately 7 dwelling units per acre (du/ac). By increasing the density by 1 du/ac, a reduction of approximately 3.14% in residential VMT can be achieved, up to a maximum reduction of 30%. However, if the density exceeds 7 du/ac, the Project will no longer qualify as a Low-Density Residential development. Consequently, the VMT per capita limit would then be compared against the VMT per capita limit for Medium-Density Residential developments, which is 17.9.

CATEGORY B: SITE ENHANCEMENT

Provide pedestrian network improvement (CAPCOA Handbook Strategy T-18) – This measure will increase the sidewalk coverage to improve pedestrian access. Providing sidewalks and an enhanced pedestrian network encourages people to walk instead of drive. This mode shift results in a reduction in VMT and GHG emissions. The 'study area' should be based on a 1 KM buffer around the area where the pedestrian network is being improved. The VMT reduction is limited to household VMT.

There are approximately 9.6 miles of sidewalk within 1km buffer around the project. By adding 1 mile of sidewalk along the project frontage, the project can achieve up to 0.5% VMT reduction. However, because there are few destinations within walking distance of the project, the actual VMT reduction is uncertain and could be lower than the estimated 0.5%.

Construct or improve bike facility (CAPCOA Handbook Strategy T-19-A) – This measure would construct or improve a single bicycle facility that connects to a larger existing bikeway network. Providing bicycle infrastructure helps to improve biking conditions within an area. This encourages a mode shift on the roadway parallel to the bicycle facility from vehicles to bicycles, displacing VMT.

A maximum of 0.06% reduction of VMT can be achieved in the Project location by adding more than 2 miles of Class I or Class IV bike facility.

CATEGORY C – TRANSIT SYSTEM IMPROVEMENTS

Extend transit network coverage or hours (CAPCOA Handbook Strategy T-25) – This measure will expand the local transit network by either adding or modifying existing transit service or extending the operation hours to enhance the service near the Project site. Starting services earlier in the morning and/or extending services to late-night hours can accommodate the commuting times of alternative-shift workers. This will encourage the use of transit and therefore reduce VMT and associated GHG emissions.

The Project shall coordinate with the City of Elk Grove and fund a Communities Facilities District (CDF) to fund on-demand transit. This may include education services, improvement or extension of SmaRT ride zone, additional on-demand transit to specific locations such as Sutter Medical Plaza Elk Grove. The Project shall coordinate to fund and implement necessary improvements to transit stops amenities (i.e., shelters) near the Project to ensure that they are adequate to accommodate new transit riders generated by the Project. 0.12% reduction for every 10% increase Total transit service miles or service hours in plan/community area.

CATEGORY D – COMMUTE TRIP REDUCTIONS

Community-based travel planning (CAPCOA Handbook Strategy T-23) – This measure will target residences in the plan/community with community-based travel planning (CBTP). CBTP is a residential-based approach to outreach that provides households with customized information, incentives, and support to encourage the use of transportation alternatives in place of single occupancy vehicles, thereby reducing household VMT and associated GHG emissions.

The Project shall fund a CDF that will provide community-based travel planning and assistance. 0.23% reduction for every 10% increase in Residences in plan/community targeted with CBTP.

CATEGORY E – IN-LIEU FEE

Create Communities Facilities District (CDF) – A CFD is a Special Tax District provided in State Law that funds the installation of public improvements or ongoing services within an identified area. A special tax is levied on taxable property within the district boundaries. Revenue received from the special tax is used to fund the CFD's authorized public facilities and or services. Creating a CFD can help fund ongoing transportation needs such as on-demand transit services, educational services, operation and maintenance of active transportation facilities. CFD will help reduce VMT by providing community-based travel planning and on-demand transit services.

IMPACT AFTER MITIGATION

The Project shall coordinate with the City of Elk Grove to ensure successful implementation of all reasonable mitigation measures that reduce the Project's VMT below the limit. However, existing evidence indicates that the effectiveness of TDM strategies with regards to vehicle trip reduction can vary based on a variety of factors, including the context of the surrounding built environment (e.g., urban versus suburban) and the aggregate effect of multiple TDM strategies deployed together. Moreover, many TDM strategies are not just site specific, but also rely on implementation and/or adoption by private entities (e.g., elective use of carpool program by residents) and other agencies (e.g., transit service operators).

Due to uncertainties regarding the ability for the aforementioned mitigation measure to reduce VMT impacts to less-than-significant levels, VMT impacts would be considered **significant and unavoidable**.

6.3.3. Impact 3: Bicycle Facilities

The internal Project roadways have bicycle infrastructure that will comply with the standard within City's Improvement standards, 2024 and will ensure adequate and safe access for bikes within the Project site. However, the Project does not propose building any off-site bicycle facility. The *City of Elk Grove Bicycle, Pedestrian, & Trails Master Plan*, May 2021 proposes planned improvements along Waterman Road but does not plan to build bicycle facility on Project frontage along Sheldon Road. The Project will add bicycle trips to existing roadways that do have bicycle facilities.

Therefore, the impact would be **significant**.

Mitigation Measure 3: Provide Bicycle Facilities

The Project shall build Class II bicycle facilities or Class I multi-use path along the Project frontage on Sheldon Road between Waterman Road and Bradshaw Road. A nexus study may be required to complete gaps in the bicycle system demand that the Project creates by adding people in the Project area. This could be addressed through the City's impact fee program or, alternatively, through a standalone in-lieu fee analysis to determine the project's responsibility for funding system improvements in the surrounding area.

Impact After Mitigation

Impact of the proposed Project on bicycle facility is considered **less than significant with mitigation**.

6.3.4. Impact 4: Pedestrian Facilities

The internal Project roadways have pedestrian infrastructure that will comply with the standard within City's Improvement standards, 2024 and will ensure adequate and safe access for pedestrians within the Project site. However, the Project does not propose building any off-site pedestrian facility. The *City of Elk Grove Bicycle, Pedestrian, & Trails Master Plan*, May 2021 also proposes Class I multi-use path along Waterman Road but does not plan to build any sidewalks on Project frontage. The Project fails to provide accessible and safe pedestrian connections between buildings and adjacent streets and transit facilities. It will also add pedestrian trips to existing roadways that do not have sidewalks.

The Project's impact on pedestrian facilities would be **significant**.

Mitigation Measure 4: Provide Pedestrian Facilities

The Project shall construct Class I multi-use path along the Project frontage on Sheldon Road between Waterman Road and Bradshaw Road. The Project shall also contribute to the planned development of the Class I multi-use path along Waterman Road between Bond Road and Calvine Road and along Sheldon Road between Elk Grove Florin and Waterman Road. A nexus study may be required to complete gaps in the bicycle system demand that the Project creates by adding people in the Project area. This could be addressed through the City's impact fee program or, alternatively, through a standalone in-lieu fee analysis to determine the project's responsibility for funding system improvements in the surrounding area.

Impact After Mitigation

Impact of the proposed Project on pedestrian facility is considered **less than significant with mitigation**.

6.3.5. Impact 5: Transit Facilities and Services

The Project location is not served by existing transit service within ½ a mile. Although the SacRT provide SmaRT Ride in the Project area, the service may not be adequate. The Project description does not include any additional transit services. As part of the mitigation measures for VMT, the Project shall coordinate with the City of Elk Grove e-tran or create CFDs to fund on-demand transit. This may include education services, improvement or extension of SmaRT ride zone, additional on-

demand transit to specific locations such as Sutter Medical Plaza Elk Grove. The Project shall use the CFDs to fund and implement necessary improvements to transit stops amenities (i.e., shelters) near the Project to ensure that they are adequate to accommodate new transit riders generated by the Project.

The demand for public transit services will not result in an increase in ridership above the crush load capacity of the transit system. The Project's impact on transit facilities and services would be considered **less than significant**. No Mitigation is required.

6.3.6. Impact 6: Transportation Hazards Related to Geometric Design Feature or Incompatible Uses

The proposed Project would only build new roadways that are internal to the Project and provide connections to Sheldon Road and Waterman Road. The City's improvement standards and design criteria to ensure that residential subdivisions and non-subdivision public right-of-way and private street improvements are designed to meet or exceed uniform levels of sound engineering practice. The design criteria address speed, sight distance, minimum and maximum roadway grade, minimum curve radius, and lighting. As part of general engineering practice, all roadway facilities would also be designed to meet applicable industry standards from the Caltrans Highway Design Manual (HDM), the California Manual on Uniform Traffic Control Devices (CAMUTCD), and The American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets. Each development application would be subject to review and approval by the City, including the City's Fire Department, which would include a review of the Project's consistency with the City's design criteria to ensure safe vehicle access is provided, including for emergency vehicles.

The Project description does not provide details on types of intersection control at the proposed gated entries. The Project access points shall be analyzed to include appropriate intersection control to minimize conflicting movements and discourage unsafe maneuver. Appropriate site distance and storage capacity shall be provided at intersections. The distance of entries from the major intersection of Sheldon Road and Waterman Road shall also be analyzed for safe queuing and sight distance. The Project shall work with the city of Elk Grove to finalize geometric design at intersections in accordance with the City guidelines. Implementation of the proposed Project would not substantially increase hazards due to design features or incompatible uses. Therefore, **no impact** is identified.

6.3.7. Impact 7: Emergency Access

The proposed Project would include three gated entries at Sheldon Road and one on Waterman Road. These routes will serve as primary emergency access routes.

The Cosumnes Community Services District operates the Cosumnes Fire Department (CFD), which provides fire and emergency medical service to the City of Elk Grove. The Cosumnes Fire Department maintains minimum requirements for emergency access, which include minimum roadway width and turning radius for fire apparatus. All internal roadways would be designed to meet these standards. Each subdivision and building permit application would be subject to review and approval by the City, including CFD to ensure specific roadway design and access standards are met. The CFD will review the Project's proposed circulation plan to ensure adequate access is provided

throughout the entire plan area. The proposed Project will participate in fee programs that fund the provision of fire and emergency medical services to ensure adequate staffing and equipment. The closest CFD fire stations are Station 73 and Station 76 and are about 1.5 miles from the Project site.

Implementation of the proposed Project would not result in inadequate emergency access. Therefore, the Project's impact on emergency services is considered **less than significant**. No Mitigation is required.

7. General Plan Consistency

This chapter summarizes the transportation improvements that are necessary to be consistent with the City of Elk Grove General Plan with special emphasis placed on facilities located in the City of Elk Grove's Rural Area, which is shown in **Figure 13**.

Figure 13: Elk Grove Rural Area

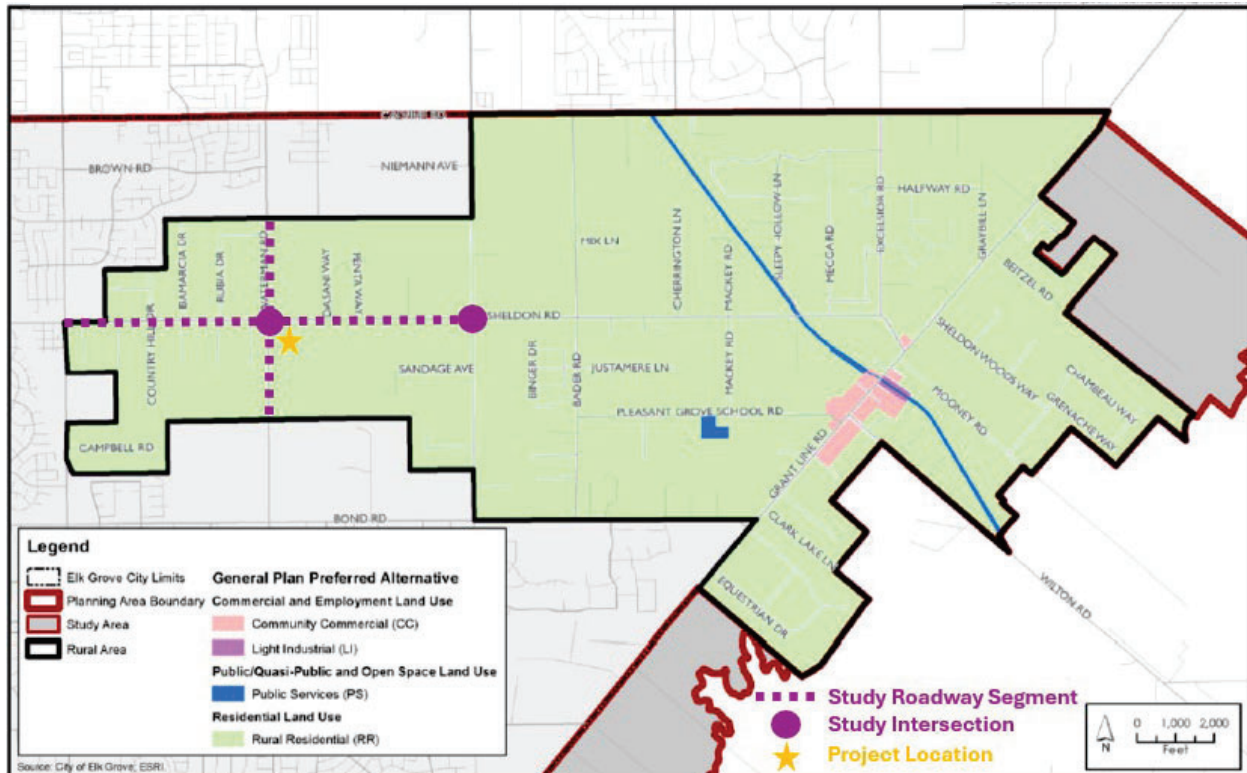


*Figure not OCR compatible.

The City's Rural Road Policy (RRP), adopted in 2007 (Amended in 2019) implements the General Plan goals, policies, and actions. Specifically, this policy implements the provisions of the Land Use and Circulation Elements regarding the preservation and maintenance of features that contribute to the rural residential character, including small local roadways with minimum paving, natural landscape, and preservation of existing mature trees. The Rural Road Improvement Policy applies to the area defined in the General Plan as the Rural Area Community Plan. Since the Project site and several study roadways/intersections are located within the areas designated under the General Plan as the Rural Area Community, the Rural Road Policy (RRP) applies.

The RRP establishes a value-based approach for incremental (rather than ultimate) road improvements. As shown in **Figure 13**, the Project is in the City of Elk Grove Rural Area and the following study facilities (highlighted in **Figure 13**) are subject to the Rural Road Improvement Policy:

Roadway Segments

Sheldon Road – Elk Grove Florin Road to Waterman Road
Sheldon Road – Waterman Road to Bradshaw Road
Waterman Road – North of Sheldon Road (Half Mile)
Waterman Road – South of Sheldon Road (Half Mile)

Intersections

Sheldon Road/Waterman Road
Sheldon Road/Bradshaw Road

The Rural Road Policy emphasizes adding capacity to intersections to postpone the need for widening complete segments of roadways.

Table 18: Intersection Improvement Steps – Daily Volume Thresholds

Improvement Step	Configuration	Daily Volume Thresholds
1	All-way stop control	≤8,000
2	Traffic signal control Separate left turn lanes or single-lane roundabout	8,000 – 15,000
3	Traffic signal control Separate left turn lanes Separate right turn lanes or single-lane roundabout	15,001 – 18,000
4	Traffic signal control Separate left turn lanes Separate right turn lanes and two through lanes	18,001 – 24,000
5	Widen roadway segment from 2 lanes to 4 lanes	24,001 – 36,000
6	Widen roadway segment from 4 lanes to 6 lanes	>36,000

Elk Grove Rural Road Policy, adopted in 2007 (Amended in 2019)
Source: Fehr & Peers, 2025

As shown in **Table 18**, the improvement transition from Step 3 to Step 4 (i.e., a daily volume > 18,000 vehicles) would require the addition of through lanes through a subject intersection to add capacity prior to Step 5, which triggered widening the roadway segment (i.e., a daily volume > 24,000 vehicles). Consequently, if a single lane roundabout was implemented at Step 3, it would be replaced with traffic signal control with Step 4 because two-lane roundabout applications were not desired at the time the RRP was developed. However, since then, the city has successfully implemented two-lane roundabout configurations, including at the Bradshaw Road/Sheldon Road intersection.

Therefore, 2-lane roundabouts are now considered an acceptable improvement with Step 4, since they can be implemented to defer roadway segment widening are considered below.

While the RRP was developed and intended to manage the implementation of capital improvement projects, it may apply to the review of development projects. To maintain consistency with the RRP, improvements identified to maintain consistency with the General Plan design targets for roadways and intersections should only be implemented when traffic volume monitoring indicates that the roadway segment volumes are exceeded. They should not be implemented based purely on a forecast of future travel conditions. Consequently, conditions placed on the Project should include fee payment for ongoing volume monitoring on Sheldon Road and Waterman Road and as appropriate fee payment for the Project's proportional share of needed improvements, which may be satisfied through payment of the City of Elk Grove Roadway Impact Fees or other proportional exaction.

Based on the existing daily traffic volumes shown in **Table 15**, the current traffic volumes do not satisfy the thresholds for widening the segments of Sheldon Road and Waterman Road in the Rural Area. At present, the measured volumes fall within Step 2 in **Table 18**. Step 3, which includes the addition of right-turn improvements, would be satisfied when the daily roadway segment volume exceeds 15,000 vehicles per day.

As shown in **Table 15**, the daily traffic volumes on the rural segments of Sheldon Road and Waterman Road would satisfy Step 3 (i.e., on Sheldon Road) and Step 4 (i.e., on Waterman Road) under General Plan Buildout conditions. These segments would also exceed their roadway design target, which would indicate the need to widen the segments from two to four lanes to maintain the roadway performance specified in General Plan Policy MOB-1-3. However, recognizing the unique context of the rural community, the General Plan also includes the following policy specific to mobility improvements in the Sheldon/Rural Area:

Policy RA-3-1: make context-sensitive design improvements to roadways in the Rural Area, when warranted, consistent with the Rural Road Improvement Policy and consistent with the intent of the Complete Streets Act.

Policy RA-3-3: Support improvements necessary to ensure safe, efficient, and improved access for mobility in the Rural Area consistent with the Rural Road Improvement Policy.

Therefore, when evaluating the effectiveness of infrastructure improvements, it is important to consider operations at the intersections along study segments, since intersections are the locations in the system where drivers typically experience poor operations characterized by long delays and queuing. As shown in **Table 20**, implementing the improvements at the Waterman Road/Sheldon Road intersection (see **Table 19**), which are consistent with the Rural Road Improvement Policy (discussed above), would result in delay below the performance delay target. In addition, the Elk Grove Florin Road/Sheldon Road and Waterman Road/Bond Road intersections, which are the other intersections at the end of the deficient roadway segments, would also operate below the performance delay targets. Therefore, implementing the recommended improvements would result in acceptable operations of the intersections in the system and would be consistent with the implementation steps of the Rural Road Improvement Policy. Consequently, widening the roadways

from two to four lanes, which would be a logical improvement based on General Plan Policy MOB-1-3 (Table 6-4), is not recommended in the rural context.

The Project is responsible for its proportional fair share towards implementing these improvements, which could be achieved through payment of the City's Roadway Impact Fees or other proportional exaction. **Table 20** summarizes the change in delays with improvement recommendations.

Appendix C includes delay reports for intersections with improvements.

Table 19: Improvement Recommendations

Location		Impacted Scenarios	Located in Rural Area?	Improvement Recommendation
Roadways	Sheldon Rd from Elk Grove Florin Rd to Waterman Rd	C+P	Yes	Consistent with the RRP, the roadway segment is within the range of improvement Step 3. However, the roadway segment impact is considered within the General Plan environmental impact report (EIR). So, the City may also consider allowing a deviation to the roadway design target, as provided in Policy MOB-1-3.
	Waterman Rd from Sheldon Rd to Bond Rd	CNP, C+P	Yes	The roadway segment impact is considered within the General Plan environmental impact report (EIR). So, the City may also consider allowing a deviation to the roadway design target, as provided in Policy MOB-1-3. In addition, with each tentative map that access Waterman Road, the applicant shall evaluate the need for a right-turn lane pocket, consistent with City's Improvement standards, 2024.
Intersections	Waterman Rd/Sheldon Rd	E+P E+AP+P, CNP, C+P	Yes	The intersection exceeds the design target under project conditions. For E+P and E+AP+P scenarios, additional capacity is required on the east leg of the roundabout. Consistent with the RRP, adding a 200 ft right turn lane will improve operations and the delay will be within performance target. This intersection exceeds the design target for both CNP and C+P scenarios. Additional capacity is required for the intersection. Reconfiguring the roundabout to a two-lane circulatory design and widening all four approaches to accommodate an additional lane for all movements at the intersection. Widening will be limited to the intersection only, with the two lanes transition to one lane after the intersection.
	Waterman Rd/Calvine Rd	ENP, E+P E+AP, E+AP+P, CNP, C+P	No	The intersection exceeds the intersection design target under existing, near-term, and cumulative conditions with and without the project. Since the Project worsens unacceptable delay conditions, the Project is responsible for its proportional fair share towards implementing the City's standard expanded intersection configuration, which could be achieved through payment of the City's Development Impact Fees.
	Bradshaw Rd/Sheldon Rd	CNP, C+P	Yes	The intersection exceeds the design target under both CNP and CPP conditions. The addition of the Project increases the delay. Reconfigure the roundabout to two-lane circulatory design and widen east-west approaches to two lanes. This widening will be limited to the intersection only. The E/W lanes will be tapered off-on to one lane after the intersection.

Source: Fehr & Peers, 2025

Table 20: Intersection Delay – With Recommended Improvements

Intersection	Traffic Control	Performance Delay Target	Scenario	Delay		Delay with Improvement		Improvements
				AM	PM	AM	PM	
1: Waterman Road/Sheldon Road	Roundabout	< 35.1	E+P	38	20	29	18	Reconfigure the roundabout to add a right turn pocket at the east leg of the roundabout.
			E+AP+P	40	21	29	19	
			CNP	97	64	24	20	Reconfigure the roundabout to a two-lane circulatory design and widen all four approaches to accommodate an additional lane for all movements at the intersection. Widening will be limited to the intersection only, with the two lanes tapering off into one lane.
			CPP	134	80	31	33	
5: Bradshaw Road/Sheldon Road	Roundabout	< 35.1	CNP	66	103	28	41	Reconfigure the roundabout to two-lane circulatory design and widen east-west approaches to two lanes. This widening will be limited to the intersection only. The E/W lanes will be tapered off-onto one lane after the intersection.
			CPP	70	108	29	43	

Notes:

Delay in **Bold** indicates delays that exceed performance targets.

Delays are rounded to the nearest whole number.

Source: Fehr & Peers, 2025

8. Project Site review

A “program-level” site plan review was conducted using the City of Elk Grove Improvement Standards, 2024. Findings and recommendations are listed below:

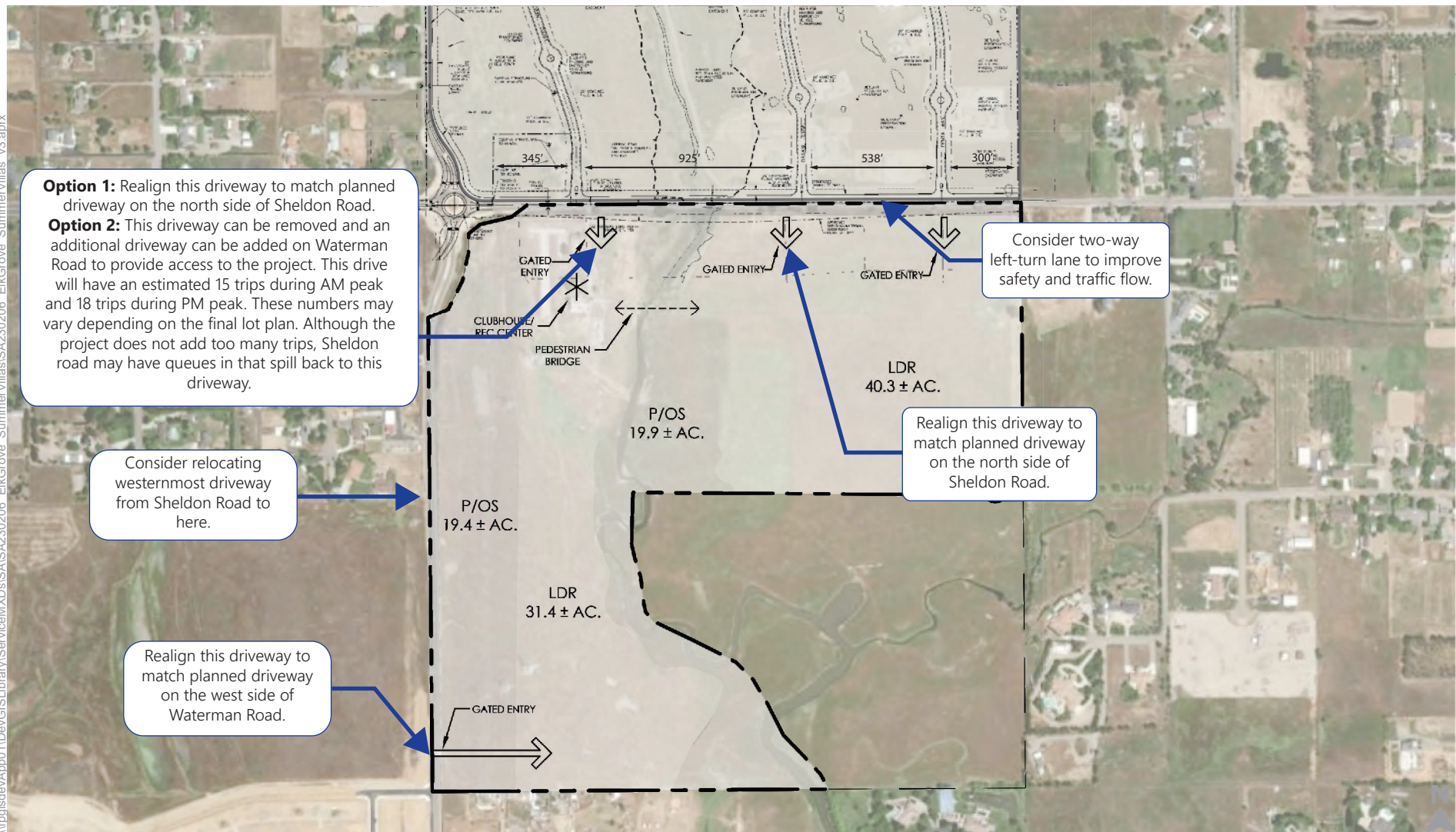
The proposed site accesses should be aligned with any existing access/street or future development site accesses on the other side of Sheldon Road and Waterman Road. **Figure 14** identifies the access locations that may need to be realigned.

Sheldon Road is heavily utilized during peak hours. Currently it is a two-lane roadway that has a posted speed of 40 mph. The Project is proposing an access 331 feet from the Sheldon Road/Waterman Road roundabout. The Project will add approximately 15 trips to that access during the AM peak hour and 18 trips during the PM peak. The numbers may vary depending on the lot allocation and final site plan. Although the number of trips would likely not cause queuing issues, if the westbound queues on Sheldon Road extend beyond the 331-foot storage, there may be access, operations, and safety issues. It is recommended that the Project remove the westernmost access from Sheldon Road and add an additional access to Waterman Road. To avoid similar conflicts, the driveway should be at least 600 feet south of the intersection to avoid any future queuing. It should also be aligned with any existing or planned access on the opposite side on Waterman Road. **Figure 14** identifies the potential location for the access roads.

A two-way left-turn lane should be added on Sheldon Road along the eastern side of the Project frontage to improve operations and enhance safety. This would ensure improved traffic flow when entering and exiting the Project site, especially when the development to the north is built.

The two proposed Project access on the east side of the Project frontage are approximately 550 ft apart. When realigned, they will be 538 ft apart. This is greater than the city’s minimum spacing requirements.

The internal bridge connecting the east and west sides of the Project should be designed and constructed to accommodate autos, bikes, and pedestrians.



- Summer Villas Boundary Line
- Sheldon Park Estates Boundary Line

Figure 14



Appendix A

Count Sheets

Fehr&Peers

National Data & Surveying Services

Intersection Turning Movement Count

Location: Waterman Rd & Sheldon Rd

City: Elk Grove

Control: 4-Way Yield

Project ID: 24-070131-001

Date: 8/20/2024

Data - Total

NS/EW Streets:	Waterman Rd				Waterman Rd				Sheldon Rd				Sheldon Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	0.3 NL	0.3 NT	0.3 NR	0 NU	0.5 SL	0.5 ST	1 SR	0 SU	0.3 EL	0.3 ET	0.3 ER	0 EU	0.3 WL	0.3 WT	0.3 WR	0 WU	
7:00 AM	15	58	21	0	2	46	13	0	12	70	20	0	14	68	2	0	341
7:15 AM	28	85	50	0	5	58	17	0	23	98	22	0	33	68	6	0	493
7:30 AM	41	99	43	0	7	104	28	0	44	72	16	0	40	79	3	0	576
7:45 AM	35	96	36	0	5	109	39	0	46	99	42	0	48	109	1	0	665
8:00 AM	49	79	36	0	12	129	57	0	27	67	52	0	40	109	12	0	669
8:15 AM	74	75	38	0	7	97	70	0	17	48	37	0	31	128	6	0	628
8:30 AM	52	67	36	0	4	81	60	0	16	66	29	0	30	105	3	0	549
8:45 AM	29	48	29	0	4	56	28	0	14	55	21	1	27	91	5	0	408
TOTAL VOLUMES :	NL 323	NT 607	NR 289	NU 0	SL 46	ST 680	SR 312	SU 0	EL 199	ET 575	ER 239	EU 1	WL 263	WT 757	WR 38	WU 0	TOTAL 4329
APPROACH %'s :	26.50%	49.79%	23.71%	0.00%	4.43%	65.51%	30.06%	0.00%	19.63%	56.71%	23.57%	0.10%	24.86%	71.55%	3.59%	0.00%	
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	199	349	153	0	31	439	194	0	134	286	147	0	159	425	22	0	2538
PEAK HR FACTOR :	0.672	0.881	0.890	0.000	0.646	0.851	0.693	0.000	0.728	0.722	0.707	0.000	0.828	0.830	0.458	0.000	0.948
	0.937				0.838				0.758				0.918				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	0.3 NL	0.3 NT	0.3 NR	0 NU	0.5 SL	0.5 ST	1 SR	0 SU	0.3 EL	0.3 ET	0.3 ER	0 EU	0.3 WL	0.3 WT	0.3 WR	0 WU	
4:00 PM	46	103	36	0	6	106	65	0	32	73	28	0	43	106	4	0	648
4:15 PM	27	54	37	2	5	83	47	0	27	98	34	0	50	114	8	0	586
4:30 PM	22	78	29	0	6	95	50	0	30	67	38	0	48	119	4	0	586
4:45 PM	28	86	38	0	8	111	48	0	29	60	49	0	44	97	2	0	600
5:00 PM	38	90	50	0	3	103	45	0	28	80	35	1	34	118	1	0	626
5:15 PM	21	71	31	0	4	86	35	0	32	67	34	0	37	112	5	0	535
5:30 PM	32	80	25	0	5	111	40	0	30	70	52	0	44	115	5	0	609
5:45 PM	39	83	34	0	4	76	25	0	23	73	45	0	46	94	2	0	544
TOTAL VOLUMES :	NL 253	NT 645	NR 280	NU 2	SL 41	ST 771	SR 355	SU 0	EL 231	ET 588	ER 315	EU 1	WL 346	WT 875	WR 31	WU 0	TOTAL 4734
APPROACH %'s :	21.44%	54.66%	23.73%	0.17%	3.51%	66.07%	30.42%	0.00%	20.35%	51.81%	27.75%	0.09%	27.64%	69.89%	2.48%	0.00%	
PEAK HR :	04:00 PM - 05:00 PM																TOTAL
PEAK HR VOL :	123	321	140	2	25	395	210	0	118	298	149	0	185	436	18	0	2420
PEAK HR FACTOR :	0.668	0.779	0.921	0.250	0.781	0.890	0.808	0.000	0.922	0.760	0.760	0.000	0.925	0.916	0.563	0.000	0.934
	0.792				0.890				0.888				0.929				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Waterman Rd & Calvine Rd

City: Elk Grove

Control: Signalized

Project ID: 24-070131-002

Date: 8/20/2024

Data - Total

NS/EW Streets:	Waterman Rd				Waterman Rd				Calvine Rd				Calvine Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	1 NL	1 NT	0 NR	0 NU	1 SL	1 ST	0 SR	0 SU	1 EL	2 ET	1 ER	0 EU	1 WL	2 WT	0 WR	0 WU	
7:00 AM	18	24	24	0	3	30	47	0	17	141	10	0	16	142	2	0	474
7:15 AM	27	39	43	0	4	52	43	0	30	154	19	0	25	128	3	0	567
7:30 AM	34	36	59	0	6	63	41	0	49	245	21	1	48	214	4	0	821
7:45 AM	19	26	92	0	19	85	55	0	78	278	49	0	67	235	9	0	1012
8:00 AM	25	26	73	0	27	63	57	0	50	212	55	0	74	280	9	2	953
8:15 AM	26	44	44	0	16	48	61	0	56	222	39	2	81	286	14	1	940
8:30 AM	35	38	30	0	7	38	53	0	14	87	22	2	76	254	4	0	660
8:45 AM	25	30	23	0	3	32	31	0	16	114	13	1	27	117	4	0	436
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	209	263	388	0	85	411	388	0	310	1453	228	6	414	1656	49	3	5863
PEAK HR :	24.30%	30.58%	45.12%	0.00%	9.62%	46.49%	43.89%	0.00%	15.52%	72.76%	11.42%	0.30%	19.51%	78.04%	2.31%	0.14%	
PEAK HR VOL :	104	132	268	0	68	259	214	0	233	957	164	3	270	1015	36	3	3726
PEAK HR FACTOR :	0.765	0.750	0.728	0.000	0.630	0.762	0.877	0.000	0.747	0.861	0.745	0.375	0.833	0.887	0.643	0.375	0.920
	0.920				0.851				0.838				0.866				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	1 NL	1 NT	0 NR	0 NU	1 SL	1 ST	0 SR	0 SU	1 EL	2 ET	1 ER	0 EU	1 WL	2 WT	0 WR	0 WU	
4:00 PM	27	72	42	0	6	57	69	0	56	181	50	1	74	238	9	0	882
4:15 PM	26	45	27	0	7	49	36	0	36	153	33	1	55	189	8	0	665
4:30 PM	33	45	32	0	4	40	29	0	53	191	45	0	77	179	6	0	734
4:45 PM	26	45	41	0	8	34	37	0	48	177	54	1	69	194	7	0	741
5:00 PM	26	39	32	0	8	58	31	0	55	170	44	0	57	179	1	0	700
5:15 PM	36	57	36	0	5	43	42	0	49	184	35	0	41	208	8	0	744
5:30 PM	26	52	37	0	7	55	38	0	67	152	50	2	46	211	5	0	748
5:45 PM	27	51	34	0	6	35	30	0	44	173	35	0	33	208	4	0	680
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	227	406	281	0	51	371	312	0	408	1381	346	5	452	1606	48	0	5894
PEAK HR :	24.84%	44.42%	30.74%	0.00%	6.95%	50.54%	42.51%	0.00%	19.07%	64.53%	16.17%	0.23%	21.46%	76.26%	2.28%	0.00%	
PEAK HR VOL :	112	207	142	0	25	180	171	0	193	702	182	3	275	800	30	0	3022
PEAK HR FACTOR :	0.848	0.719	0.845	0.000	0.781	0.789	0.620	0.000	0.862	0.919	0.843	0.750	0.893	0.840	0.833	0.000	0.857
	0.817				0.712				0.934				0.861				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Waterman Rd & Bond Rd

City: Elk Grove

Control: Signalized

Project ID: 24-070131-003

Date: 8/20/2024

Data - Total

NS/EW Streets:	Waterman Rd				Waterman Rd				Bond Rd				Bond Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	2 NL	2 NT	1 NR	0 NU	2 SL	2 ST	1 SR	0 SU	2 EL	2 ET	1 ER	0 EU	2 WL	2 WT	1 WR	0 WU	
7:00 AM	23	45	5	0	15	39	28	2	31	70	20	0	7	98	17	0	400
7:15 AM	23	84	5	1	19	46	38	0	59	89	23	1	7	123	28	0	546
7:30 AM	59	83	12	0	20	65	68	1	63	104	20	2	12	149	32	0	690
7:45 AM	123	74	15	0	41	81	65	2	56	127	35	2	10	154	33	0	818
8:00 AM	166	62	18	0	89	89	52	0	52	142	102	2	13	154	58	0	999
8:15 AM	54	60	6	0	42	100	30	1	52	103	150	4	19	153	78	0	852
8:30 AM	38	43	10	1	15	83	37	1	55	80	35	2	21	152	51	0	624
8:45 AM	28	44	11	0	8	66	40	4	26	57	23	2	13	117	20	0	459
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	514	495	82	2	249	569	358	11	394	772	408	15	102	1100	317	0	5388
PEAK HR :	47.03%	45.29%	7.50%	0.18%	20.98%	47.94%	30.16%	0.93%	24.80%	48.58%	25.68%	0.94%	6.71%	72.42%	20.87%	0.00%	
PEAK HR VOL :	07:30 AM - 08:30 AM				192	335	215	4	223	476	307	10	54	610	201	0	TOTAL
PEAK HR FACTOR :	0.605	0.840	0.708	0.000	0.539	0.838	0.790	0.500	0.885	0.838	0.512	0.625	0.711	0.990	0.644	0.000	3359
	0.744				0.811				0.822				0.865				0.841

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	2 NL	2 NT	1 NR	0 NU	2 SL	2 ST	1 SR	0 SU	2 EL	2 ET	1 ER	0 EU	2 WL	2 WT	1 WR	0 WU	
4:00 PM	39	66	23	1	33	82	59	5	35	130	47	1	22	149	55	0	747
4:15 PM	48	72	21	0	35	81	58	0	37	120	48	1	22	152	21	0	716
4:30 PM	37	79	20	0	35	89	62	3	39	137	66	2	17	104	14	0	704
4:45 PM	39	65	15	1	39	101	62	1	56	126	64	2	21	104	14	0	710
5:00 PM	35	86	24	1	34	94	45	4	62	134	52	5	10	124	23	0	733
5:15 PM	42	75	24	2	25	86	39	3	35	143	68	2	12	150	14	0	720
5:30 PM	47	74	18	0	37	103	52	5	39	153	62	1	17	139	20	1	768
5:45 PM	41	61	17	0	19	106	51	3	51	133	53	0	21	147	39	0	742
TOTAL VOLUMES :	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
APPROACH %'s :	328	578	162	5	257	742	428	24	354	1076	460	14	142	1069	200	1	5840
PEAK HR :	30.57%	53.87%	15.10%	0.47%	17.71%	51.14%	29.50%	1.65%	18.59%	56.51%	24.16%	0.74%	10.06%	75.71%	14.16%	0.07%	
PEAK HR VOL :	05:00 PM - 06:00 PM				115	389	187	15	187	563	235	8	60	560	96	1	TOTAL
PEAK HR FACTOR :	0.878	0.860	0.865	0.375	0.777	0.917	0.899	0.750	0.754	0.920	0.864	0.400	0.714	0.933	0.615	0.250	2963
	0.937				0.896				0.974				0.866				0.965

National Data & Surveying Services

Intersection Turning Movement Count

Location: Elk Grove Florin Rd & Sheldon Rd

City: Elk Grove

Control: Signalized

Project ID: 24-070131-004

Date: 8/20/2024

Data - Total

NS/EW Streets:	Elk Grove Florin Rd				Elk Grove Florin Rd				Sheldon Rd				Sheldon Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	2 NL	2 NT	0 NR	0 NU	2 SL	3 ST	1 SR	0 SU	2 EL	2 ET	1 ER	0 EU	2 WL	2 WT	1 WR	0 WU	
7:00 AM	12	86	13	0	10	74	66	5	56	87	9	2	8	74	8	0	510
7:15 AM	15	134	25	0	16	110	72	10	66	101	15	0	15	93	11	0	683
7:30 AM	15	151	26	0	20	173	83	7	59	107	29	0	36	107	20	0	833
7:45 AM	16	141	21	0	28	199	112	11	108	111	43	2	47	115	29	0	983
8:00 AM	25	167	15	0	37	192	111	19	104	78	39	0	38	113	42	0	980
8:15 AM	28	161	26	0	22	162	110	23	127	80	29	0	55	161	54	0	1038
8:30 AM	27	185	15	0	20	215	121	6	69	69	20	1	53	147	27	0	975
8:45 AM	28	128	18	0	16	152	96	9	42	53	18	1	31	123	19	0	734
TOTAL VOLUMES :	NL 166	NT 1153	NR 159	NU 0	SL 169	ST 1277	SR 771	SU 90	EL 631	ET 686	ER 202	EU 6	WL 283	WT 933	WR 210	WU 0	TOTAL 6736
APPROACH %'s :	11.23%	78.01%	10.76%	0.00%	7.33%	55.35%	33.42%	3.90%	41.38%	44.98%	13.25%	0.39%	19.85%	65.43%	14.73%	0.00%	
PEAK HR :	07:45 AM - 08:45 AM																TOTAL
PEAK HR VOL :	96	654	77	0	107	768	454	59	408	338	131	3	193	536	152	0	3976
PEAK HR FACTOR :	0.857	0.884	0.740	0.000	0.723	0.893	0.938	0.641	0.803	0.761	0.762	0.375	0.877	0.832	0.704	0.000	0.958
	0.911				0.959				0.833				0.816				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	2 NL	2 NT	0 NR	0 NU	2 SL	3 ST	1 SR	0 SU	2 EL	2 ET	1 ER	0 EU	2 WL	2 WT	1 WR	0 WU	
4:00 PM	26	157	23	0	14	163	104	11	122	108	27	2	39	159	22	0	977
4:15 PM	38	206	38	0	34	225	116	14	84	100	33	0	32	134	19	0	1073
4:30 PM	22	148	24	1	27	199	107	12	111	105	34	1	38	132	11	0	972
4:45 PM	20	154	35	1	21	192	104	10	98	85	20	2	47	139	20	0	948
5:00 PM	28	158	29	0	21	182	121	23	97	98	23	1	34	144	24	0	983
5:15 PM	26	223	15	0	21	208	104	19	115	104	37	1	37	105	19	0	1034
5:30 PM	32	158	22	1	31	195	118	16	119	111	39	1	36	118	23	0	1020
5:45 PM	32	145	21	0	24	187	100	24	106	101	36	1	21	122	17	0	937
TOTAL VOLUMES :	NL 224	NT 1349	NR 207	NU 3	SL 193	ST 1551	SR 874	SU 129	EL 852	ET 812	ER 249	EU 9	WL 284	WT 1053	WR 155	WU 0	TOTAL 7944
APPROACH %'s :	12.56%	75.66%	11.61%	0.17%	7.03%	56.46%	31.82%	4.70%	44.33%	42.25%	12.96%	0.47%	19.03%	70.58%	10.39%	0.00%	
PEAK HR :	04:45 PM - 05:45 PM																TOTAL
PEAK HR VOL :	106	693	101	2	94	777	447	68	429	398	119	5	154	506	86	0	3985
PEAK HR FACTOR :	0.828	0.777	0.721	0.500	0.758	0.934	0.924	0.739	0.901	0.896	0.763	0.625	0.819	0.878	0.896	0.000	0.963
	0.854				0.963				0.881				0.905				

National Data & Surveying Services

Intersection Turning Movement Count

Location: Bradshaw Rd & Sheldon Rd

City: Elk Grove

Control: 4-Way Yield

Project ID: 24-070131-005

Date: 8/20/2024

Data - Total

NS/EW Streets:	Bradshaw Rd				Bradshaw Rd				Sheldon Rd				Sheldon Rd				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	0.5 NL	1 NT	0.5 NR	0 NU	0.5 SL	1 ST	0.5 SR	0 SU	0.3 EL	0.3 ET	0.3 ER	0 EU	0.3 WL	0.3 WT	0.3 WR	0 WU	
7:00 AM	13	162	5	0	3	94	29	0	49	30	4	0	11	38	7	0	445
7:15 AM	9	202	21	0	5	124	55	0	95	36	11	0	28	45	6	1	638
7:30 AM	13	241	18	0	5	150	73	0	70	35	12	0	31	54	6	0	708
7:45 AM	11	239	28	0	10	235	83	2	76	38	20	0	52	55	5	0	854
8:00 AM	22	223	48	0	6	261	88	1	50	43	13	0	65	46	6	0	872
8:15 AM	20	219	62	0	4	200	81	1	72	45	9	0	32	52	6	0	803
8:30 AM	16	210	51	0	2	121	86	0	60	38	6	0	5	34	7	0	636
8:45 AM	12	99	7	0	6	93	49	0	36	53	6	0	5	40	3	0	409
TOTAL VOLUMES :	NL 116	NT 1595	NR 240	NU 0	SL 41	ST 1278	SR 544	SU 4	EL 508	ET 318	ER 81	EU 0	WL 229	WT 364	WR 46	WU 1	TOTAL 5365
APPROACH %'s :	5.95%	81.75%	12.30%	0.00%	2.20%	68.45%	29.14%	0.21%	56.01%	35.06%	8.93%	0.00%	35.78%	56.88%	7.19%	0.16%	
PEAK HR :	07:30 AM - 08:30 AM																TOTAL
PEAK HR VOL :	66	922	156	0	25	846	325	4	268	161	54	0	180	207	23	0	3237
PEAK HR FACTOR :	0.750	0.956	0.629	0.000	0.625	0.810	0.923	0.500	0.882	0.894	0.675	0.000	0.692	0.941	0.958	0.000	0.928
	0.950				0.843				0.901				0.876				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				TOTAL
	0.5 NL	1 NT	0.5 NR	0 NU	0.5 SL	1 ST	0.5 SR	0 SU	0.3 EL	0.3 ET	0.3 ER	0 EU	0.3 WL	0.3 WT	0.3 WR	0 WU	
4:00 PM	13	213	83	0	11	177	65	0	45	64	7	0	11	57	7	0	753
4:15 PM	7	136	28	0	4	200	96	1	42	85	6	0	13	47	6	0	671
4:30 PM	8	95	9	0	7	203	89	2	40	50	10	0	9	67	6	0	595
4:45 PM	6	122	10	0	9	185	91	0	39	55	15	0	22	46	7	0	607
5:00 PM	4	134	18	0	6	156	85	1	54	56	11	0	19	58	6	0	608
5:15 PM	15	134	14	0	2	177	100	2	32	45	10	0	25	47	3	0	606
5:30 PM	9	118	25	0	5	169	76	0	49	53	11	0	13	64	6	0	598
5:45 PM	3	101	18	0	3	206	83	0	49	49	10	0	16	47	8	0	593
TOTAL VOLUMES :	NL 65	NT 1053	NR 205	NU 0	SL 47	ST 1473	SR 685	SU 6	EL 350	ET 457	ER 80	EU 0	WL 128	WT 433	WR 49	WU 0	TOTAL 5031
APPROACH %'s :	4.91%	79.59%	15.50%	0.00%	2.13%	66.62%	30.98%	0.27%	39.46%	51.52%	9.02%	0.00%	20.98%	70.98%	8.03%	0.00%	
PEAK HR :	04:00 PM - 05:00 PM																TOTAL
PEAK HR VOL :	34	566	130	0	31	765	341	3	166	254	38	0	55	217	26	0	2626
PEAK HR FACTOR :	0.654	0.664	0.392	0.000	0.705	0.942	0.888	0.375	0.922	0.747	0.633	0.000	0.625	0.810	0.929	0.000	0.872
	0.591				0.947				0.861				0.909				

Appendix B

Delay Reports

Fehr&Peers

MOVEMENT SUMMARY

 Site: 1 [Waterman & Sheldon AM Peak Hour (Site Folder: ENP)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Waterman Road															
3	L2	All MCs	209	2.0	209	2.0	0.633	11.3	LOS B	6.8	173.9	0.79	0.73	1.18	29.9
8	T1	All MCs	367	2.0	367	2.0	0.633	11.3	LOS B	6.8	173.9	0.79	0.73	1.18	30.5
18	R2	All MCs	161	2.0	161	2.0	0.633	11.3	LOS B	6.8	173.9	0.79	0.73	1.18	30.2
Approach			738	2.0	738	2.0	0.633	11.3	LOS B	6.8	173.9	0.79	0.73	1.18	30.2
East: Sheldon Road															
1	L2	All MCs	167	2.0	167	2.0	0.923	40.8	LOS E	16.0	407.0	1.00	1.56	2.88	21.6
6	T1	All MCs	447	2.0	447	2.0	0.923	40.8	LOS E	16.0	407.0	1.00	1.56	2.88	21.9
16	R2	All MCs	23	2.0	23	2.0	0.923	40.8	LOS E	16.0	407.0	1.00	1.56	2.88	21.8
Approach			638	2.0	638	2.0	0.923	40.8	LOS E	16.0	407.0	1.00	1.56	2.88	21.8
North: Waterman Road															
7	L2	All MCs	33	2.0	33	2.0	0.812	30.0	LOS D	7.9	201.2	0.92	1.19	1.95	24.3
4	T1	All MCs	462	2.0	462	2.0	0.812	30.0	LOS D	7.9	201.2	0.92	1.19	1.95	24.7
14	R2	All MCs	204	2.0	204	2.0	0.335	10.5	LOS B	1.4	36.0	0.68	0.67	0.77	30.9
Approach			699	2.0	699	2.0	0.812	24.3	LOS C	7.9	201.2	0.85	1.04	1.61	26.2
West: Sheldon Road															
5	L2	All MCs	141	2.0	141	2.0	0.724	18.2	LOS C	7.7	194.3	0.90	1.01	1.62	27.5
2	T1	All MCs	301	2.0	301	2.0	0.724	18.2	LOS C	7.7	194.3	0.90	1.01	1.62	27.9
12	R2	All MCs	155	2.0	155	2.0	0.724	18.2	LOS C	7.7	194.3	0.90	1.01	1.62	27.7
Approach			597	2.0	597	2.0	0.724	18.2	LOS C	7.7	194.3	0.90	1.01	1.62	27.8
All Vehicles			2672	2.0	2672	2.0	0.923	23.3	LOS C	16.0	407.0	0.88	1.07	1.80	26.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\1_Existing\Summer_Villas.sip9

HCM 6th Signalized Intersection Summary

2: Waterman Rd & Calvin Rd

Existing AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	236	957	164	273	1015	36	104	132	268	68	259	214
Future Volume (veh/h)	236	957	164	273	1015	36	104	132	268	68	259	214
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	257	1040	65	297	1103	39	113	143	291	74	282	233
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	268	1097	486	305	1156	41	122	165	335	94	272	224
Arrive On Green	0.15	0.31	0.31	0.17	0.33	0.33	0.07	0.30	0.30	0.05	0.29	0.29
Sat Flow, veh/h	1781	3554	1575	1781	3501	124	1781	543	1105	1781	946	782
Grp Volume(v), veh/h	257	1040	65	297	560	582	113	0	434	74	0	515
Grp Sat Flow(s),veh/h/ln	1781	1777	1575	1781	1777	1848	1781	0	1648	1781	0	1728
Q Serve(g_s), s	18.0	35.9	3.7	20.8	38.6	38.7	7.9	0.0	31.2	5.1	0.0	36.0
Cycle Q Clear(g_c), s	18.0	35.9	3.7	20.8	38.6	38.7	7.9	0.0	31.2	5.1	0.0	36.0
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.67	1.00		0.45
Lane Grp Cap(c), veh/h	268	1097	486	305	587	610	122	0	499	94	0	496
V/C Ratio(X)	0.96	0.95	0.13	0.97	0.95	0.95	0.92	0.00	0.87	0.79	0.00	1.04
Avail Cap(c_a), veh/h	268	1097	486	305	587	610	122	0	499	121	0	496
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	52.8	42.4	31.3	51.7	41.1	41.1	58.1	0.0	41.4	58.7	0.0	44.7
Incr Delay (d2), s/veh	42.9	17.3	0.6	43.7	27.4	26.8	57.8	0.0	14.6	17.4	0.0	50.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	17.7	1.5	12.7	20.6	21.4	5.4	0.0	14.2	2.7	0.0	21.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	95.7	59.6	31.8	95.3	68.5	67.9	115.8	0.0	55.9	76.1	0.0	95.4
LnGrp LOS	F	E	C	F	E	E	F	A	E	E	A	F
Approach Vol, veh/h	1362			1439			547			589		
Approach Delay, s/veh	65.1			73.8			68.3			93.0		
Approach LOS	E			E			E			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.3	46.8	14.1	41.2	26.0	44.1	12.1	43.2				
Change Period (Y+Rc), s	* 4.4	* 5.4	5.5	* 5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	* 19	* 41	8.6	* 36	21.5	38.3	8.5	* 36				
Max Q Clear Time (g_c+I1), s	20.0	40.7	9.9	38.0	22.8	37.9	7.1	33.2				
Green Ext Time (p_c), s	0.0	0.3	0.0	0.0	0.0	0.2	0.0	0.3				

Intersection Summary

HCM 6th Ctrl Delay 72.9

HCM 6th LOS E

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

3: Waterman Rd & Bond Rd

Existing AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	233	476	307	54	610	201	402	279	51	196	335	215
Future Volume (veh/h)	233	476	307	54	610	201	402	279	51	196	335	215
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	277	567	107	64	726	63	479	332	1	233	399	37
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	383	1449	645	317	1382	616	460	554	244	382	475	212
Arrive On Green	0.11	0.41	0.41	0.09	0.39	0.39	0.13	0.16	0.16	0.11	0.13	0.13
Sat Flow, veh/h	3456	3554	1582	3456	3554	1585	3456	3554	1564	3456	3554	1585
Grp Volume(v), veh/h	277	567	107	64	726	63	479	332	1	233	399	37
Grp Sat Flow(s),veh/h/ln	1728	1777	1582	1728	1777	1585	1728	1777	1564	1728	1777	1585
Q Serve(g_s), s	7.7	11.2	4.3	1.7	15.6	2.5	13.2	8.6	0.1	6.4	10.9	2.1
Cycle Q Clear(g_c), s	7.7	11.2	4.3	1.7	15.6	2.5	13.2	8.6	0.1	6.4	10.9	2.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	383	1449	645	317	1382	616	460	554	244	382	475	212
V/C Ratio(X)	0.72	0.39	0.17	0.20	0.53	0.10	1.04	0.60	0.00	0.61	0.84	0.17
Avail Cap(c_a), veh/h	383	1449	645	383	1382	616	460	1361	599	494	1396	623
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.7	20.7	18.7	41.7	23.3	19.3	43.0	39.0	35.4	42.1	42.0	38.1
Incr Delay (d2), s/veh	5.8	0.8	0.6	0.1	1.4	0.3	53.4	0.4	0.0	0.6	1.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	4.5	1.6	0.7	6.3	0.9	8.8	3.6	0.0	2.6	4.7	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	48.4	21.5	19.2	41.8	24.7	19.6	96.4	39.4	35.4	42.7	43.5	38.3
LnGrp LOS	D	C	B	D	C	B	F	D	D	D	D	D
Approach Vol, veh/h	951			853			812			669		
Approach Delay, s/veh	29.1			25.6			73.0			42.9		
Approach LOS	C			C			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.8	44.4	19.0	19.1	14.9	46.3	16.8	21.3				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	11.0	38.6	13.2	39.0	11.0	38.6	14.2	38.0				
Max Q Clear Time (g_c+l1), s	9.7	17.6	15.2	12.9	3.7	13.2	8.4	10.6				
Green Ext Time (p_c), s	0.0	0.7	0.0	0.4	0.0	0.5	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay	41.9											
HCM 6th LOS	D											

HCM 6th Signalized Intersection Summary

4: Elk Grove Florin Rd & Sheldon Rd

Existing AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	411	338	131	193	536	152	96	654	77	166	768	454
Future Volume (veh/h)	411	338	131	193	536	152	96	654	77	166	768	454
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	447	367	26	210	583	24	104	711	84	180	835	292
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	491	820	366	335	660	294	287	1278	570	301	1858	577
Arrive On Green	0.14	0.23	0.23	0.10	0.19	0.19	0.08	0.36	0.36	0.09	0.37	0.37
Sat Flow, veh/h	3428	3526	1572	3428	3526	1572	3428	3526	1572	3428	5066	1572
Grp Volume(v), veh/h	447	367	26	210	583	24	104	711	84	180	835	292
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1714	1763	1572	1714	1763	1572	1714	1689	1572
Q Serve(g_s), s	13.1	9.1	1.3	6.0	16.4	1.3	2.9	16.4	3.7	5.2	12.8	14.7
Cycle Q Clear(g_c), s	13.1	9.1	1.3	6.0	16.4	1.3	2.9	16.4	3.7	5.2	12.8	14.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	491	820	366	335	660	294	287	1278	570	301	1858	577
V/C Ratio(X)	0.91	0.45	0.07	0.63	0.88	0.08	0.36	0.56	0.15	0.60	0.45	0.51
Avail Cap(c_a), veh/h	491	1503	670	440	1451	647	302	1278	570	302	1858	577
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.1	33.5	30.6	44.2	40.4	34.2	44.2	26.0	21.9	44.8	24.5	25.1
Incr Delay (d2), s/veh	20.7	0.1	0.0	0.7	1.6	0.0	0.3	1.7	0.5	2.3	0.8	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	3.8	0.5	2.5	7.0	0.5	1.2	6.8	1.4	2.2	4.9	5.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.8	33.7	30.6	45.0	42.0	34.3	44.5	27.7	22.4	47.1	25.3	28.3
LnGrp LOS	E	C	C	D	D	C	D	C	C	D	C	C
Approach Vol, veh/h		840			817			899			1307	
Approach Delay, s/veh		49.6			42.5			29.2			29.0	
Approach LOS		D			D			C			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.3	43.2	20.0	24.5	14.7	42.8	15.4	29.1				
Change Period (Y+Rc), s	5.8	5.8	5.4	5.4	5.8	5.8	5.4	5.4				
Max Green Setting (Gmax), s	9.0	37.0	14.6	42.0	9.0	37.0	13.1	43.5				
Max Q Clear Time (g_c+I1), s	4.9	16.7	15.1	18.4	7.2	18.4	8.0	11.1				
Green Ext Time (p_c), s	0.0	0.9	0.0	0.7	0.0	0.7	0.0	0.4				

Intersection Summary

HCM 6th Ctrl Delay	36.4
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon AM Peak Hour (Site Folder: ENP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Bradshaw Road															
3	L2	All MCs	71	3.0	71	3.0	0.599	9.4	LOS A	5.7	145.3	0.70	0.62	1.00	31.2
8	T1	All MCs	991	3.0	991	3.0	0.599	10.1	LOS B	5.7	145.3	0.65	0.56	0.88	32.3
18	R2	All MCs	168	3.0	168	3.0	0.303	5.3	LOS A	1.4	35.2	0.51	0.36	0.51	33.6
Approach			1230	3.0	1230	3.0	0.599	9.4	LOS A	5.7	145.3	0.64	0.53	0.84	32.4
East: Sheldon Road															
1	L2	All MCs	194	3.0	194	3.0	1.033	82.3	LOS F	15.4	393.5	1.00	1.99	4.62	15.5
6	T1	All MCs	223	3.0	223	3.0	1.033	82.3	LOS F	15.4	393.5	1.00	1.99	4.62	15.7
16	R2	All MCs	25	3.0	25	3.0	1.033	89.1	LOS F	15.4	393.5	1.00	1.99	4.62	15.6
Approach			441	3.0	441	3.0	1.033	82.7	LOS F	15.4	393.5	1.00	1.99	4.62	15.6
North: Bradshaw Road															
7	L2	All MCs	27	3.0	27	3.0	0.619	9.8	LOS A	6.3	162.2	0.71	0.64	1.04	31.2
4	T1	All MCs	910	3.0	910	3.0	0.619	9.8	LOS A	6.3	162.2	0.70	0.61	1.00	32.0
14	R2	All MCs	349	3.0	349	3.0	0.313	5.3	LOS A	1.4	37.0	0.51	0.35	0.51	33.4
Approach			1286	3.0	1286	3.0	0.619	8.6	LOS A	6.3	162.2	0.65	0.54	0.86	32.3
West: Sheldon Road															
5	L2	All MCs	288	3.0	288	3.0	0.795	27.0	LOS D	6.4	163.3	0.88	1.18	1.92	24.5
2	T1	All MCs	173	3.0	173	3.0	0.795	27.0	LOS D	6.4	163.3	0.88	1.18	1.92	24.9
12	R2	All MCs	58	3.0	58	3.0	0.795	32.2	LOS D	6.4	163.3	0.88	1.18	1.92	24.7
Approach			519	3.0	519	3.0	0.795	27.6	LOS D	6.4	163.3	0.88	1.18	1.92	24.6
All Vehicles			3476	3.0	3476	3.0	1.033	21.1	LOS C	15.4	393.5	0.72	0.82	1.49	27.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\1_Existing\Summer_Villas.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon PM Peak Hour (Site Folder: ENP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist]				
			veh/h		veh/h		v/c	sec			ft				mph
South: Waterman Road															
3	L2	All MCs	134	1.0	134	1.0	0.652	13.5	LOS B	7.2	181.3	0.82	0.81	1.30	29.2
8	T1	All MCs	345	1.0	345	1.0	0.652	13.5	LOS B	7.2	181.3	0.82	0.81	1.30	29.7
18	R2	All MCs	151	1.0	151	1.0	0.652	13.5	LOS B	7.2	181.3	0.82	0.81	1.30	29.5
Approach			630	1.0	630	1.0	0.652	13.5	LOS B	7.2	181.3	0.82	0.81	1.30	29.6
East: Sheldon Road															
1	L2	All MCs	199	1.0	199	1.0	0.809	23.0	LOS C	11.8	297.0	0.98	1.18	2.03	26.0
6	T1	All MCs	469	1.0	469	1.0	0.809	23.0	LOS C	11.8	297.0	0.98	1.18	2.03	26.4
16	R2	All MCs	19	1.0	19	1.0	0.809	23.0	LOS C	11.8	297.0	0.98	1.18	2.03	26.2
Approach			687	1.0	687	1.0	0.809	23.0	LOS C	11.8	297.0	0.98	1.18	2.03	26.2
North: Waterman Road															
7	L2	All MCs	27	1.0	27	1.0	0.705	21.2	LOS C	5.6	141.0	0.85	1.00	1.50	26.9
4	T1	All MCs	425	1.0	425	1.0	0.705	21.2	LOS C	5.6	141.0	0.85	1.00	1.50	27.3
14	R2	All MCs	226	1.0	226	1.0	0.353	10.4	LOS B	1.6	39.6	0.68	0.67	0.78	31.0
Approach			677	1.0	677	1.0	0.705	17.6	LOS C	5.6	141.0	0.80	0.89	1.26	28.4
West: Sheldon Road															
5	L2	All MCs	127	1.0	127	1.0	0.535	9.4	LOS A	4.2	104.7	0.75	0.69	1.02	30.8
2	T1	All MCs	320	1.0	320	1.0	0.535	9.4	LOS A	4.2	104.7	0.75	0.69	1.02	31.4
12	R2	All MCs	160	1.0	160	1.0	0.535	9.4	LOS A	4.2	104.7	0.75	0.69	1.02	31.2
Approach			608	1.0	608	1.0	0.535	9.4	LOS A	4.2	104.7	0.75	0.69	1.02	31.2
All Vehicles			2602	1.0	2602	1.0	0.809	16.1	LOS C	11.8	297.0	0.84	0.90	1.41	28.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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HCM 6th Signalized Intersection Summary

2: Waterman Rd & Calvin Rd

Existing PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	196	702	182	275	800	30	112	207	142	25	180	171
Future Volume (veh/h)	196	702	182	275	800	30	112	207	142	25	180	171
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	228	816	25	320	930	35	130	241	165	29	209	199
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	261	871	389	342	1019	38	151	341	233	36	231	220
Arrive On Green	0.15	0.24	0.24	0.19	0.29	0.29	0.08	0.33	0.33	0.02	0.26	0.26
Sat Flow, veh/h	1795	3582	1598	1795	3519	132	1795	1042	714	1795	881	838
Grp Volume(v), veh/h	228	816	25	320	473	492	130	0	406	29	0	408
Grp Sat Flow(s),veh/h/ln	1795	1791	1598	1795	1791	1861	1795	0	1756	1795	0	1719
Q Serve(g_s), s	11.7	21.0	1.1	16.5	24.0	24.0	6.7	0.0	19.0	1.5	0.0	21.5
Cycle Q Clear(g_c), s	11.7	21.0	1.1	16.5	24.0	24.0	6.7	0.0	19.0	1.5	0.0	21.5
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.41	1.00		0.49
Lane Grp Cap(c), veh/h	261	871	389	342	519	539	151	0	574	36	0	452
V/C Ratio(X)	0.87	0.94	0.06	0.94	0.91	0.91	0.86	0.00	0.71	0.81	0.00	0.90
Avail Cap(c_a), veh/h	264	871	389	342	519	539	151	0	712	113	0	659
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.3	34.8	27.3	37.4	32.2	32.2	42.5	0.0	27.7	45.9	0.0	33.5
Incr Delay (d2), s/veh	25.0	18.5	0.3	31.9	22.9	22.3	35.1	0.0	1.6	15.0	0.0	9.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	10.8	0.4	9.9	12.9	13.3	4.3	0.0	7.6	0.8	0.0	9.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.3	53.4	27.6	69.4	55.1	54.5	77.6	0.0	29.2	60.8	0.0	42.7
LnGrp LOS	E	D	C	E	E	D	E	A	C	E	A	D
Approach Vol, veh/h	1069			1285			536			437		
Approach Delay, s/veh	55.1			58.4			41.0			43.9		
Approach LOS	E			E			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.0	32.6	13.4	29.9	22.4	28.2	7.4	35.9				
Change Period (Y+Rc), s	* 4.4	* 5.4	5.5	* 5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	* 14	* 27	7.9	* 36	17.9	22.6	5.9	* 38				
Max Q Clear Time (g_c+I1), s	13.7	26.0	8.7	23.5	18.5	23.0	3.5	21.0				
Green Ext Time (p_c), s	0.0	0.4	0.0	0.7	0.0	0.0	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay	52.6											
HCM 6th LOS	D											
Notes												
User approved ignoring U-Turning movement.												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												

HCM 6th Signalized Intersection Summary

3: Waterman Rd & Bond Rd

Existing PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	173	513	225	82	509	104	165	282	79	151	353	241
Future Volume (veh/h)	173	513	225	82	509	104	165	282	79	151	353	241
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	175	518	96	83	514	41	167	285	12	153	357	36
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	389	1511	664	351	1472	656	388	461	205	386	459	205
Arrive On Green	0.11	0.42	0.42	0.10	0.41	0.41	0.11	0.13	0.13	0.11	0.13	0.13
Sat Flow, veh/h	3483	3582	1575	3483	3582	1595	3483	3582	1590	3483	3582	1598
Grp Volume(v), veh/h	175	518	96	83	514	41	167	285	12	153	357	36
Grp Sat Flow(s),veh/h/ln	1742	1791	1575	1742	1791	1595	1742	1791	1590	1742	1791	1598
Q Serve(g_s), s	4.6	9.5	3.7	2.1	9.6	1.5	4.4	7.4	0.6	4.0	9.4	2.0
Cycle Q Clear(g_c), s	4.6	9.5	3.7	2.1	9.6	1.5	4.4	7.4	0.6	4.0	9.4	2.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	389	1511	664	351	1472	656	388	461	205	386	459	205
V/C Ratio(X)	0.45	0.34	0.14	0.24	0.35	0.06	0.43	0.62	0.06	0.40	0.78	0.18
Avail Cap(c_a), veh/h	403	1511	664	400	1472	656	400	1439	639	400	1439	642
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.5	19.1	17.4	40.4	19.8	17.4	40.5	40.2	37.3	40.3	41.2	37.9
Incr Delay (d2), s/veh	0.3	0.6	0.5	0.1	0.7	0.2	0.3	0.5	0.0	0.2	1.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	3.8	1.3	0.9	3.9	0.6	1.8	3.1	0.2	1.7	4.1	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.8	19.7	17.8	40.5	20.4	17.6	40.7	40.8	37.4	40.6	42.3	38.1
LnGrp LOS	D	B	B	D	C	B	D	D	D	D	D	D
Approach Vol, veh/h		789			638			464			546	
Approach Delay, s/veh		24.2			22.9			40.7			41.5	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.7	45.9	16.7	18.3	15.6	47.0	16.6	18.4				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	11.3	40.1	11.2	39.2	11.2	40.2	11.2	39.2				
Max Q Clear Time (g_c+I1), s	6.6	11.6	6.4	11.4	4.1	11.5	6.0	9.4				
Green Ext Time (p_c), s	0.0	0.5	0.0	0.3	0.0	0.5	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay			30.9									
HCM 6th LOS			C									
Notes												
User approved ignoring U-Turning movement.												

HCM 6th Signalized Intersection Summary

4: Elk Grove Florin Rd & Sheldon Rd

Existing PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	420	398	114	156	564	72	108	665	120	143	779	431
Future Volume (veh/h)	420	398	114	156	564	72	108	665	120	143	779	431
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	452	428	25	168	606	12	116	715	129	154	838	277
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	487	870	388	331	710	315	290	1269	566	297	1834	569
Arrive On Green	0.14	0.24	0.24	0.10	0.20	0.20	0.08	0.36	0.36	0.09	0.36	0.36
Sat Flow, veh/h	3456	3554	1585	3456	3554	1578	3456	3554	1584	3456	5106	1585
Grp Volume(v), veh/h	452	428	25	168	606	12	116	715	129	154	838	277
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1578	1728	1777	1584	1728	1702	1585
Q Serve(g_s), s	13.4	10.7	1.3	4.8	17.0	0.6	3.3	16.8	5.9	4.4	13.0	14.1
Cycle Q Clear(g_c), s	13.4	10.7	1.3	4.8	17.0	0.6	3.3	16.8	5.9	4.4	13.0	14.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	487	870	388	331	710	315	290	1269	566	297	1834	569
V/C Ratio(X)	0.93	0.49	0.06	0.51	0.85	0.04	0.40	0.56	0.23	0.52	0.46	0.49
Avail Cap(c_a), veh/h	487	1558	695	374	1441	640	300	1269	566	300	1834	569
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.0	33.6	30.0	44.5	40.0	33.4	45.0	26.8	23.3	45.3	25.4	25.8
Incr Delay (d2), s/veh	23.8	0.2	0.0	0.4	1.2	0.0	0.3	1.8	0.9	0.7	0.8	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	4.5	0.5	2.0	7.3	0.2	1.4	7.0	2.3	1.9	5.1	5.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.8	33.7	30.0	45.0	41.1	33.4	45.3	28.6	24.2	46.0	26.3	28.7
LnGrp LOS	E	C	C	D	D	C	D	C	C	D	C	C
Approach Vol, veh/h					786				960			
Approach Delay, s/veh	50.6				41.8				30.0			
Approach LOS	D				D				C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.5	43.0	20.0	26.1	14.7	42.8	15.3	30.8				
Change Period (Y+Rc), s	5.8	5.8	5.4	5.4	5.8	5.8	5.4	5.4				
Max Green Setting (Gmax), s	9.0	37.0	14.6	42.0	9.0	37.0	11.2	45.4				
Max Q Clear Time (g_c+I1), s	5.3	16.1	15.4	19.0	6.4	18.8	6.8	12.7				
Green Ext Time (p_c), s	0.0	0.9	0.0	0.7	0.0	0.7	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	36.9
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon PM Peak Hour (Site Folder: ENP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Bradshaw Road															
3	L2	All MCs	39	3.0	39	3.0	0.574	11.4	LOS B	4.6	118.4	0.73	0.70	1.07	30.4
8	T1	All MCs	651	3.0	651	3.0	0.574	11.3	LOS B	4.6	118.4	0.69	0.64	0.97	31.4
18	R2	All MCs	149	3.0	149	3.0	0.290	6.6	LOS A	1.2	31.8	0.56	0.44	0.56	32.9
Approach			839	3.0	839	3.0	0.574	10.5	LOS B	4.6	118.4	0.67	0.61	0.90	31.6
East: Sheldon Road															
1	L2	All MCs	63	3.0	63	3.0	0.951	68.1	LOS F	11.0	281.9	0.97	1.56	3.06	17.3
6	T1	All MCs	249	3.0	249	3.0	0.951	68.1	LOS F	11.0	281.9	0.97	1.56	3.06	17.5
16	R2	All MCs	30	3.0	30	3.0	0.951	72.5	LOS F	11.0	281.9	0.97	1.56	3.06	17.4
Approach			343	3.0	343	3.0	0.951	68.5	LOS F	11.0	281.9	0.97	1.56	3.06	17.4
North: Bradshaw Road															
7	L2	All MCs	39	3.0	39	3.0	0.608	9.3	LOS A	6.1	156.0	0.66	0.51	0.86	31.4
4	T1	All MCs	879	3.0	879	3.0	0.608	9.3	LOS A	6.1	156.0	0.65	0.50	0.84	32.1
14	R2	All MCs	392	3.0	392	3.0	0.308	5.1	LOS A	1.5	37.5	0.45	0.29	0.45	33.5
Approach			1310	3.0	1310	3.0	0.608	8.0	LOS A	6.1	156.0	0.59	0.44	0.72	32.5
West: Sheldon Road															
5	L2	All MCs	191	3.0	191	3.0	0.747	22.1	LOS C	5.9	151.7	0.86	1.08	1.71	26.2
2	T1	All MCs	292	3.0	292	3.0	0.747	22.1	LOS C	5.9	151.7	0.86	1.08	1.71	26.6
12	R2	All MCs	44	3.0	44	3.0	0.747	26.4	LOS D	5.9	151.7	0.86	1.08	1.71	26.4
Approach			526	3.0	526	3.0	0.747	22.4	LOS C	5.9	151.7	0.86	1.08	1.71	26.4
All Vehicles			3018	3.0	3018	3.0	0.951	18.1	LOS C	11.0	281.9	0.70	0.73	1.21	28.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\1_Existing\Summer_Villas.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon AM Peak Hour (Site Folder: Existing Plus Project)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Waterman Road															
3	L2	All MCs	220	2.0	220	2.0	0.667	12.3	LOS B	7.9	199.6	0.83	0.80	1.30	29.5
8	T1	All MCs	378	2.0	378	2.0	0.667	12.3	LOS B	7.9	199.6	0.83	0.80	1.30	30.0
18	R2	All MCs	169	2.0	169	2.0	0.667	12.3	LOS B	7.9	199.6	0.83	0.80	1.30	29.8
Approach			767	2.0	767	2.0	0.667	12.3	LOS B	7.9	199.6	0.83	0.80	1.30	29.8
East: Sheldon Road															
1	L2	All MCs	188	2.0	188	2.0	1.111	90.1	LOS F	39.5	1003.5	1.00	2.66	5.99	14.7
6	T1	All MCs	509	2.0	509	2.0	1.111	90.1	LOS F	39.5	1003.5	1.00	2.66	5.99	14.9
16	R2	All MCs	54	2.0	54	2.0	1.111	90.1	LOS F	39.5	1003.5	1.00	2.66	5.99	14.8
Approach			752	2.0	752	2.0	1.111	90.1	LOS F	39.5	1003.5	1.00	2.66	5.99	14.8
North: Waterman Road															
7	L2	All MCs	38	2.0	38	2.0	0.844	33.9	LOS D	8.8	222.8	0.94	1.26	2.13	23.3
4	T1	All MCs	464	2.0	464	2.0	0.844	33.9	LOS D	8.8	222.8	0.94	1.26	2.13	23.7
14	R2	All MCs	204	2.0	204	2.0	0.343	10.9	LOS B	1.5	37.1	0.69	0.69	0.79	30.7
Approach			706	2.0	706	2.0	0.844	27.3	LOS D	8.8	222.8	0.86	1.10	1.74	25.3
West: Sheldon Road															
5	L2	All MCs	141	2.0	141	2.0	0.745	19.5	LOS C	8.2	208.1	0.92	1.05	1.70	27.1
2	T1	All MCs	311	2.0	311	2.0	0.745	19.5	LOS C	8.2	208.1	0.92	1.05	1.70	27.5
12	R2	All MCs	157	2.0	157	2.0	0.745	19.5	LOS C	8.2	208.1	0.92	1.05	1.70	27.3
Approach			608	2.0	608	2.0	0.745	19.5	LOS C	8.2	208.1	0.92	1.05	1.70	27.4
All Vehicles			2834	2.0	2834	2.0	1.111	38.2	LOS E	39.5	1003.5	0.90	1.42	2.74	22.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\2_Existing Plus Project

Summer_Villas.sip9

HCM 6th Signalized Intersection Summary

2: Waterman Rd & Calvin Rd

Existing Plus Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	236	957	166	273	1015	36	114	161	270	68	264	214
Future Volume (veh/h)	236	957	166	273	1015	36	114	161	270	68	264	214
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	257	1040	40	297	1103	39	124	175	293	74	287	233
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	271	1139	505	309	1200	42	133	187	313	93	266	216
Arrive On Green	0.15	0.32	0.32	0.17	0.34	0.34	0.07	0.30	0.30	0.05	0.28	0.28
Sat Flow, veh/h	1781	3554	1575	1781	3501	124	1781	621	1040	1781	954	775
Grp Volume(v), veh/h	257	1040	40	297	560	582	124	0	468	74	0	520
Grp Sat Flow(s),veh/h/ln	1781	1777	1575	1781	1777	1848	1781	0	1661	1781	0	1729
Q Serve(g_s), s	19.4	38.1	2.4	22.4	40.9	41.0	9.4	0.0	37.1	5.6	0.0	37.8
Cycle Q Clear(g_c), s	19.4	38.1	2.4	22.4	40.9	41.0	9.4	0.0	37.1	5.6	0.0	37.8
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.63	1.00		0.45
Lane Grp Cap(c), veh/h	271	1139	505	309	609	633	133	0	501	93	0	483
V/C Ratio(X)	0.95	0.91	0.08	0.96	0.92	0.92	0.93	0.00	0.93	0.79	0.00	1.08
Avail Cap(c_a), veh/h	271	1139	505	309	609	633	133	0	502	93	0	483
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	56.9	44.2	32.1	55.5	42.7	42.7	62.3	0.0	46.0	63.4	0.0	48.8
Incr Delay (d2), s/veh	40.3	12.6	0.3	40.3	21.2	20.7	57.2	0.0	24.5	33.5	0.0	63.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	18.1	0.9	13.3	20.9	21.6	6.3	0.0	18.2	3.3	0.0	24.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	97.2	56.7	32.4	95.8	63.9	63.4	119.5	0.0	70.5	97.0	0.0	112.1
LnGrp LOS	F	E	C	F	E	E	F	A	E	F	A	F
Approach Vol, veh/h	1337				1439				592			
Approach Delay, s/veh	63.8				70.3				80.8			
Approach LOS	E				E				F			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	25.0	51.8	15.6	43.0	28.0	48.8	12.6	46.0				
Change Period (Y+Rc), s	* 4.4	* 5.4	5.5	* 5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	* 21	* 46	10.1	* 38	23.5	43.0	7.1	* 41				
Max Q Clear Time (g_c+I1), s	21.4	43.0	11.4	39.8	24.4	40.1	7.6	39.1				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.0	0.0	1.0	0.0	0.2				

Intersection Summary

HCM 6th Ctrl Delay 75.7
HCM 6th LOS E

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

3: Waterman Rd & Bond Rd

Existing Plus Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	238	476	307	54	610	201	402	284	51	206	355	246
Future Volume (veh/h)	238	476	307	54	610	201	402	284	51	206	355	246
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	283	567	114	64	726	66	479	338	0	245	423	69
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	380	1437	640	316	1372	612	456	577	257	380	498	222
Arrive On Green	0.11	0.40	0.40	0.09	0.39	0.39	0.13	0.16	0.00	0.11	0.14	0.14
Sat Flow, veh/h	3456	3554	1582	3456	3554	1585	3456	3554	1585	3456	3554	1585
Grp Volume(v), veh/h	283	567	114	64	726	66	479	338	0	245	423	69
Grp Sat Flow(s),veh/h/ln	1728	1777	1582	1728	1777	1585	1728	1777	1585	1728	1777	1585
Q Serve(g_s), s	7.9	11.3	4.6	1.7	15.8	2.7	13.2	8.8	0.0	6.8	11.6	3.9
Cycle Q Clear(g_c), s	7.9	11.3	4.6	1.7	15.8	2.7	13.2	8.8	0.0	6.8	11.6	3.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	380	1437	640	316	1372	612	456	577	257	380	498	222
V/C Ratio(X)	0.74	0.39	0.18	0.20	0.53	0.11	1.05	0.59	0.00	0.65	0.85	0.31
Avail Cap(c_a), veh/h	380	1437	640	380	1372	612	456	1325	591	515	1386	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.2	21.1	19.1	42.1	23.7	19.7	43.4	38.8	0.0	42.6	42.0	38.7
Incr Delay (d2), s/veh	6.9	0.8	0.6	0.1	1.5	0.4	56.0	0.4	0.0	0.7	1.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	4.5	1.7	0.7	6.4	1.0	8.9	3.7	0.0	2.8	5.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.1	21.9	19.7	42.2	25.2	20.0	99.4	39.1	0.0	43.3	43.6	38.9
LnGrp LOS	D	C	B	D	C	C	F	D	A	D	D	D
Approach Vol, veh/h	964			856			817			737		
Approach Delay, s/veh	29.9			26.0			74.4			43.1		
Approach LOS	C			C			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.8	44.4	19.0	19.8	14.9	46.3	16.8	22.0				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	11.0	38.6	13.2	39.0	11.0	38.6	14.9	37.3				
Max Q Clear Time (g_c+I1), s	9.9	17.8	15.2	13.6	3.7	13.3	8.8	10.8				
Green Ext Time (p_c), s	0.0	0.7	0.0	0.4	0.0	0.5	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay	42.6											
HCM 6th LOS	D											
Notes												
User approved ignoring U-Turning movement.												

HCM 6th Signalized Intersection Summary

4: Elk Grove Florin Rd & Sheldon Rd

Existing Plus Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	411	347	131	199	597	154	96	654	78	166	768	454
Future Volume (veh/h)	411	347	131	199	597	154	96	654	78	166	768	454
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	447	377	27	216	649	34	104	711	85	180	835	291
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	479	880	393	328	724	323	281	1249	557	294	1814	563
Arrive On Green	0.14	0.25	0.25	0.10	0.21	0.21	0.08	0.35	0.35	0.09	0.36	0.36
Sat Flow, veh/h	3428	3526	1572	3428	3526	1572	3428	3526	1572	3428	5066	1572
Grp Volume(v), veh/h	447	377	27	216	649	34	104	711	85	180	835	291
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1714	1763	1572	1714	1763	1572	1714	1689	1572
Q Serve(g_s), s	13.5	9.4	1.4	6.3	18.7	1.8	3.0	17.0	3.9	5.3	13.2	15.2
Cycle Q Clear(g_c), s	13.5	9.4	1.4	6.3	18.7	1.8	3.0	17.0	3.9	5.3	13.2	15.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	479	880	393	328	724	323	281	1249	557	294	1814	563
V/C Ratio(X)	0.93	0.43	0.07	0.66	0.90	0.11	0.37	0.57	0.15	0.61	0.46	0.52
Avail Cap(c_a), veh/h	479	1449	646	450	1418	633	296	1249	557	296	1814	563
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.4	32.9	29.9	45.6	40.4	33.7	45.4	27.3	23.0	46.1	25.8	26.4
Incr Delay (d2), s/veh	24.9	0.1	0.0	0.8	1.7	0.1	0.3	1.9	0.6	2.7	0.8	3.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	3.9	0.5	2.7	8.0	0.7	1.2	7.1	1.5	2.3	5.2	6.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.3	33.0	29.9	46.4	42.0	33.7	45.7	29.1	23.6	48.7	26.6	29.8
LnGrp LOS	E	C	C	D	D	C	D	C	C	D	C	C
Approach Vol, veh/h	851			899			900			1306		
Approach Delay, s/veh	52.0			42.8			30.5			30.3		
Approach LOS	D			D			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.4	43.2	20.0	26.9	14.8	42.8	15.4	31.5				
Change Period (Y+Rc), s	5.8	5.8	5.4	5.4	5.8	5.8	5.4	5.4				
Max Green Setting (Gmax), s	9.0	37.0	14.6	42.0	9.0	37.0	13.7	42.9				
Max Q Clear Time (g_c+I1), s	5.0	17.2	15.5	20.7	7.3	19.0	8.3	11.4				
Green Ext Time (p_c), s	0.0	0.9	0.0	0.7	0.0	0.7	0.0	0.4				

Intersection Summary

HCM 6th Ctrl Delay	37.9
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon AM Peak Hour (Site Folder: Existing Plus Project)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Bradshaw Road															
3	L2	All MCs	71	3.0	71	3.0	0.613	9.8	LOS A	5.9	152.2	0.72	0.67	1.07	31.0
8	T1	All MCs	991	3.0	991	3.0	0.613	10.5	LOS B	5.9	152.2	0.67	0.59	0.93	32.2
18	R2	All MCs	168	3.0	168	3.0	0.310	5.4	LOS A	1.4	35.9	0.53	0.38	0.53	33.5
Approach			1230	3.0	1230	3.0	0.613	9.7	LOS A	5.9	152.2	0.66	0.57	0.89	32.3
East: Sheldon Road															
1	L2	All MCs	194	3.0	194	3.0	1.055	89.2	LOS F	17.0	435.2	1.00	2.10	5.03	14.8
6	T1	All MCs	224	3.0	224	3.0	1.055	89.2	LOS F	17.0	435.2	1.00	2.10	5.03	15.0
16	R2	All MCs	25	3.0	25	3.0	1.055	96.1	LOS F	17.0	435.2	1.00	2.10	5.03	14.9
Approach			442	3.0	442	3.0	1.055	89.6	LOS F	17.0	435.2	1.00	2.10	5.03	14.9
North: Bradshaw Road															
7	L2	All MCs	31	3.0	31	3.0	0.620	9.7	LOS A	6.4	163.2	0.71	0.64	1.04	31.2
4	T1	All MCs	910	3.0	910	3.0	0.620	9.8	LOS A	6.4	163.2	0.69	0.61	0.99	32.0
14	R2	All MCs	353	3.0	353	3.0	0.313	5.3	LOS A	1.4	37.1	0.51	0.35	0.51	33.4
Approach			1294	3.0	1294	3.0	0.620	8.6	LOS A	6.4	163.2	0.64	0.54	0.86	32.3
West: Sheldon Road															
5	L2	All MCs	308	3.0	308	3.0	0.842	31.5	LOS D	7.7	197.4	0.91	1.28	2.20	23.4
2	T1	All MCs	182	3.0	182	3.0	0.842	31.5	LOS D	7.7	197.4	0.91	1.28	2.20	23.7
12	R2	All MCs	60	3.0	60	3.0	0.842	36.7	LOS E	7.7	197.4	0.91	1.28	2.20	23.6
Approach			549	3.0	549	3.0	0.842	32.1	LOS D	7.7	197.4	0.91	1.28	2.20	23.5
All Vehicles			3515	3.0	3515	3.0	1.055	22.8	LOS C	17.0	435.2	0.73	0.86	1.60	26.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\2_Existing Plus Project

Summer_Villas.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon PM Peak Hour (Site Folder: Existing Plus Project)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Waterman Road															
3	L2	All MCs	138	1.0	138	1.0	0.732	17.6	LOS C	9.0	228.1	0.91	1.00	1.63	27.7
8	T1	All MCs	348	1.0	348	1.0	0.732	17.6	LOS C	9.0	228.1	0.91	1.00	1.63	28.2
18	R2	All MCs	166	1.0	166	1.0	0.732	17.6	LOS C	9.0	228.1	0.91	1.00	1.63	28.0
Approach			652	1.0	652	1.0	0.732	17.6	LOS C	9.0	228.1	0.91	1.00	1.63	28.1
East: Sheldon Road															
1	L2	All MCs	206	1.0	206	1.0	0.861	27.8	LOS D	14.7	370.9	1.00	1.33	2.34	24.6
6	T1	All MCs	490	1.0	490	1.0	0.861	27.8	LOS D	14.7	370.9	1.00	1.33	2.34	25.0
16	R2	All MCs	30	1.0	30	1.0	0.861	27.8	LOS D	14.7	370.9	1.00	1.33	2.34	24.8
Approach			727	1.0	727	1.0	0.861	27.8	LOS D	14.7	370.9	1.00	1.33	2.34	24.9
North: Waterman Road															
7	L2	All MCs	55	1.0	55	1.0	0.788	27.4	LOS D	7.2	182.7	0.90	1.13	1.80	25.0
4	T1	All MCs	434	1.0	434	1.0	0.788	27.4	LOS D	7.2	182.7	0.90	1.13	1.80	25.4
14	R2	All MCs	226	1.0	226	1.0	0.364	10.8	LOS B	1.6	41.1	0.69	0.69	0.81	30.8
Approach			715	1.0	715	1.0	0.788	22.2	LOS C	7.2	182.7	0.84	0.99	1.49	26.8
West: Sheldon Road															
5	L2	All MCs	127	1.0	127	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.1
2	T1	All MCs	377	1.0	377	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.6
12	R2	All MCs	170	1.0	170	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.4
Approach			674	1.0	674	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.5
All Vehicles			2768	1.0	2768	1.0	0.861	20.0	LOS C	14.7	370.9	0.89	1.04	1.68	27.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\2_Existing Plus Project

\Summer_Villas.sip9

HCM 6th Signalized Intersection Summary

2: Waterman Rd & Calvin Rd

Existing Plus Project PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	196	702	191	277	800	30	115	217	143	25	206	171
Future Volume (veh/h)	196	702	191	277	800	30	115	217	143	25	206	171
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	228	816	36	322	930	35	134	252	166	29	240	199
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	257	916	409	349	1085	41	154	360	237	36	259	215
Arrive On Green	0.14	0.26	0.26	0.19	0.31	0.31	0.09	0.34	0.34	0.02	0.27	0.27
Sat Flow, veh/h	1795	3582	1598	1795	3519	132	1795	1060	698	1795	946	784
Grp Volume(v), veh/h	228	816	36	322	473	492	134	0	418	29	0	439
Grp Sat Flow(s),veh/h/ln	1795	1791	1598	1795	1791	1861	1795	0	1759	1795	0	1730
Q Serve(g_s), s	13.5	23.8	1.9	19.1	26.9	26.9	8.0	0.0	22.3	1.7	0.0	26.8
Cycle Q Clear(g_c), s	13.5	23.8	1.9	19.1	26.9	26.9	8.0	0.0	22.3	1.7	0.0	26.8
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.40	1.00		0.45
Lane Grp Cap(c), veh/h	257	916	409	349	552	574	154	0	597	36	0	473
V/C Ratio(X)	0.89	0.89	0.09	0.92	0.86	0.86	0.87	0.00	0.70	0.80	0.00	0.93
Avail Cap(c_a), veh/h	268	916	409	356	552	574	154	0	638	101	0	575
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	45.6	38.8	30.7	42.8	35.2	35.2	48.9	0.0	31.0	52.9	0.0	38.3
Incr Delay (d2), s/veh	26.3	12.7	0.4	27.9	15.7	15.2	36.5	0.0	2.5	14.0	0.0	17.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	11.6	0.7	10.8	13.5	14.0	5.0	0.0	9.4	0.9	0.0	13.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	71.9	51.5	31.1	70.7	50.9	50.4	85.4	0.0	33.5	66.9	0.0	56.1
LnGrp LOS	E	D	C	E	D	D	F	A	C	E	A	E
Approach Vol, veh/h	1080			1287			552			468		
Approach Delay, s/veh	55.2			55.7			46.1			56.8		
Approach LOS	E			E			D			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.9	38.8	14.8	34.8	25.6	33.1	7.7	42.0				
Change Period (Y+Rc), s	* 4.4	* 5.4	5.5	* 5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	* 16	* 33	9.3	* 36	21.5	27.6	6.1	* 39				
Max Q Clear Time (g_c+I1), s	15.5	28.9	10.0	28.8	21.1	25.8	3.7	24.3				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.6	0.0	0.5	0.0	0.7				

Intersection Summary

HCM 6th Ctrl Delay 54.1
HCM 6th LOS D

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

3: Waterman Rd & Bond Rd

Existing Plus Project PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	201	513	225	82	509	104	165	308	79	154	360	252
Future Volume (veh/h)	201	513	225	82	509	104	165	308	79	154	360	252
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	203	518	96	83	514	41	167	311	12	156	364	38
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	394	1493	656	353	1451	646	391	468	208	389	466	208
Arrive On Green	0.11	0.42	0.42	0.10	0.41	0.41	0.11	0.13	0.13	0.11	0.13	0.13
Sat Flow, veh/h	3483	3582	1574	3483	3582	1595	3483	3582	1590	3483	3582	1598
Grp Volume(v), veh/h	203	518	96	83	514	41	167	311	12	156	364	38
Grp Sat Flow(s),veh/h/ln	1742	1791	1574	1742	1791	1595	1742	1791	1590	1742	1791	1598
Q Serve(g_s), s	5.3	9.6	3.7	2.1	9.7	1.5	4.3	8.0	0.6	4.0	9.5	2.1
Cycle Q Clear(g_c), s	5.3	9.6	3.7	2.1	9.7	1.5	4.3	8.0	0.6	4.0	9.5	2.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	394	1493	656	353	1451	646	391	468	208	389	466	208
V/C Ratio(X)	0.52	0.35	0.15	0.24	0.35	0.06	0.43	0.66	0.06	0.40	0.78	0.18
Avail Cap(c_a), veh/h	453	1493	656	395	1451	646	403	1449	643	403	1449	646
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.5	19.3	17.5	40.1	20.0	17.6	40.1	40.1	36.9	40.0	40.8	37.6
Incr Delay (d2), s/veh	0.4	0.6	0.5	0.1	0.7	0.2	0.3	0.6	0.0	0.2	1.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	3.8	1.3	0.9	3.9	0.6	1.8	3.4	0.2	1.7	4.1	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.9	19.9	18.0	40.2	20.7	17.8	40.4	40.7	36.9	40.3	41.9	37.7
LnGrp LOS	D	B	B	D	C	B	D	D	D	D	D	D
Approach Vol, veh/h	817			638			490			558		
Approach Delay, s/veh	24.9			23.0			40.5			41.2		
Approach LOS	C			C			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.8	45.1	16.7	18.4	15.6	46.2	16.6	18.5				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	12.6	38.8	11.2	39.2	11.0	40.4	11.2	39.2				
Max Q Clear Time (g_c+I1), s	7.3	11.7	6.3	11.5	4.1	11.6	6.0	10.0				
Green Ext Time (p_c), s	0.0	0.5	0.0	0.3	0.0	0.5	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay	31.1											
HCM 6th LOS	C											
Notes												
User approved ignoring U-Turning movement.												

HCM 6th Signalized Intersection Summary

4: Elk Grove Florin Rd & Sheldon Rd

Existing Plus Project PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	420	452	114	158	585	73	108	665	125	145	779	431
Future Volume (veh/h)	420	452	114	158	585	73	108	665	125	145	779	431
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	452	486	24	170	629	12	116	715	134	156	838	277
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	483	890	397	329	731	325	288	1260	561	295	1820	565
Arrive On Green	0.14	0.25	0.25	0.10	0.21	0.21	0.08	0.35	0.35	0.09	0.36	0.36
Sat Flow, veh/h	3456	3554	1585	3456	3554	1578	3456	3554	1584	3456	5106	1585
Grp Volume(v), veh/h	452	486	24	170	629	12	116	715	134	156	838	277
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1578	1728	1777	1584	1728	1702	1585
Q Serve(g_s), s	13.5	12.4	1.2	4.9	17.8	0.6	3.3	17.0	6.2	4.5	13.2	14.2
Cycle Q Clear(g_c), s	13.5	12.4	1.2	4.9	17.8	0.6	3.3	17.0	6.2	4.5	13.2	14.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	483	890	397	329	731	325	288	1260	561	295	1820	565
V/C Ratio(X)	0.94	0.55	0.06	0.52	0.86	0.04	0.40	0.57	0.24	0.53	0.46	0.49
Avail Cap(c_a), veh/h	483	1546	689	371	1430	635	298	1260	561	298	1820	565
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.4	34.0	29.8	44.9	40.0	33.2	45.4	27.2	23.8	45.7	25.9	26.2
Incr Delay (d2), s/veh	25.3	0.2	0.0	0.5	1.2	0.0	0.3	1.9	1.0	0.8	0.8	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.3	5.2	0.5	2.1	7.6	0.2	1.4	7.1	2.4	1.9	5.2	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.7	34.2	29.8	45.4	41.2	33.2	45.7	29.1	24.8	46.6	26.7	29.2
LnGrp LOS	E	C	C	D	D	C	D	C	C	D	C	C
Approach Vol, veh/h					811				965			
Approach Delay, s/veh	50.8				42.0				30.5			
Approach LOS	D				D				C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.5	43.0	20.0	26.9	14.7	42.8	15.3	31.6				
Change Period (Y+Rc), s	5.8	5.8	5.4	5.4	5.8	5.8	5.4	5.4				
Max Green Setting (Gmax), s	9.0	37.0	14.6	42.0	9.0	37.0	11.2	45.4				
Max Q Clear Time (g_c+l1), s	5.3	16.2	15.5	19.8	6.5	19.0	6.9	14.4				
Green Ext Time (p_c), s	0.0	0.9	0.0	0.7	0.0	0.7	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	37.4
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon PM Peak Hour (Site Folder: Existing Plus Project)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site

Site Category: (None)

Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Bradshaw Road															
3	L2	All MCs	41	3.0	41	3.0	0.581	11.6	LOS B	4.7	120.9	0.73	0.71	1.09	30.3
8	T1	All MCs	651	3.0	651	3.0	0.581	11.5	LOS B	4.7	120.9	0.70	0.66	0.99	31.3
18	R2	All MCs	149	3.0	149	3.0	0.294	6.7	LOS A	1.3	32.2	0.57	0.45	0.57	32.8
Approach			841	3.0	841	3.0	0.581	10.7	LOS B	4.7	120.9	0.68	0.62	0.92	31.5
East: Sheldon Road															
1	L2	All MCs	63	3.0	63	3.0	0.984	76.3	LOS F	12.8	327.1	0.99	1.67	3.43	16.3
6	T1	All MCs	257	3.0	257	3.0	0.984	76.3	LOS F	12.8	327.1	0.99	1.67	3.43	16.4
16	R2	All MCs	30	3.0	30	3.0	0.984	80.7	LOS F	12.8	327.1	0.99	1.67	3.43	16.4
Approach			351	3.0	351	3.0	0.984	76.7	LOS F	12.8	327.1	0.99	1.67	3.43	16.4
North: Bradshaw Road															
7	L2	All MCs	39	3.0	39	3.0	0.621	9.6	LOS A	6.6	169.3	0.68	0.55	0.92	31.2
4	T1	All MCs	879	3.0	879	3.0	0.621	9.6	LOS A	6.6	169.3	0.67	0.54	0.90	31.9
14	R2	All MCs	410	3.0	410	3.0	0.314	5.2	LOS A	1.5	38.4	0.46	0.30	0.46	33.5
Approach			1329	3.0	1329	3.0	0.621	8.2	LOS A	6.6	169.3	0.60	0.46	0.77	32.4
West: Sheldon Road															
5	L2	All MCs	198	3.0	198	3.0	0.763	23.1	LOS C	6.2	159.6	0.87	1.10	1.76	25.8
2	T1	All MCs	295	3.0	295	3.0	0.763	23.1	LOS C	6.2	159.6	0.87	1.10	1.76	26.3
12	R2	All MCs	45	3.0	45	3.0	0.763	27.4	LOS D	6.2	159.6	0.87	1.10	1.76	26.1
Approach			538	3.0	538	3.0	0.763	23.5	LOS C	6.2	159.6	0.87	1.10	1.76	26.1
All Vehicles			3059	3.0	3059	3.0	0.984	19.4	LOS C	12.8	327.1	0.72	0.76	1.29	27.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\2_Existing Plus Project

\Summer_Villas.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon AM Peak Hour (Site Folder: EAP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Waterman Road															
3	L2	All MCs	213	2.0	213	2.0	0.645	11.6	LOS B	7.3	184.2	0.80	0.75	1.22	29.8
8	T1	All MCs	376	2.0	376	2.0	0.645	11.6	LOS B	7.3	184.2	0.80	0.75	1.22	30.3
18	R2	All MCs	164	2.0	164	2.0	0.645	11.6	LOS B	7.3	184.2	0.80	0.75	1.22	30.1
Approach			753	2.0	753	2.0	0.645	11.6	LOS B	7.3	184.2	0.80	0.75	1.22	30.1
East: Sheldon Road															
1	L2	All MCs	167	2.0	167	2.0	0.935	43.4	LOS E	16.8	426.8	1.00	1.62	3.01	21.1
6	T1	All MCs	448	2.0	448	2.0	0.935	43.4	LOS E	16.8	426.8	1.00	1.62	3.01	21.4
16	R2	All MCs	23	2.0	23	2.0	0.935	43.4	LOS E	16.8	426.8	1.00	1.62	3.01	21.3
Approach			639	2.0	639	2.0	0.935	43.4	LOS E	16.8	426.8	1.00	1.62	3.01	21.3
North: Waterman Road															
7	L2	All MCs	33	2.0	33	2.0	0.816	30.4	LOS D	8.0	203.0	0.92	1.20	1.97	24.2
4	T1	All MCs	462	2.0	462	2.0	0.816	30.4	LOS D	8.0	203.0	0.92	1.20	1.97	24.6
14	R2	All MCs	205	2.0	205	2.0	0.338	10.6	LOS B	1.4	36.5	0.69	0.67	0.78	30.9
Approach			700	2.0	700	2.0	0.816	24.6	LOS C	8.0	203.0	0.85	1.04	1.62	26.1
West: Sheldon Road															
5	L2	All MCs	141	2.0	141	2.0	0.724	18.2	LOS C	7.6	194.3	0.90	1.01	1.62	27.5
2	T1	All MCs	301	2.0	301	2.0	0.724	18.2	LOS C	7.6	194.3	0.90	1.01	1.62	27.9
12	R2	All MCs	155	2.0	155	2.0	0.724	18.2	LOS C	7.6	194.3	0.90	1.01	1.62	27.7
Approach			597	2.0	597	2.0	0.724	18.2	LOS C	7.6	194.3	0.90	1.01	1.62	27.8
All Vehicles			2688	2.0	2688	2.0	0.935	24.0	LOS C	16.8	426.8	0.88	1.09	1.84	26.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\3_Existing Plus Approved Project\Summer_Villas.sip9

HCM 6th Signalized Intersection Summary

2: Waterman Rd & Calvin Rd

Existing Plus Approved Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	236	957	172	273	1015	36	110	135	268	68	260	214
Future Volume (veh/h)	236	957	172	273	1015	36	110	135	268	68	260	214
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	257	1040	69	297	1103	39	120	147	291	74	283	233
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	268	1083	480	305	1142	40	129	170	337	94	272	224
Arrive On Green	0.15	0.30	0.30	0.17	0.33	0.33	0.07	0.31	0.31	0.05	0.29	0.29
Sat Flow, veh/h	1781	3554	1575	1781	3501	124	1781	554	1096	1781	948	780
Grp Volume(v), veh/h	257	1040	69	297	560	582	120	0	438	74	0	516
Grp Sat Flow(s),veh/h/ln	1781	1777	1575	1781	1777	1848	1781	0	1650	1781	0	1728
Q Serve(g_s), s	18.0	36.1	4.0	20.8	38.9	38.9	8.4	0.0	31.4	5.1	0.0	36.0
Cycle Q Clear(g_c), s	18.0	36.1	4.0	20.8	38.9	38.9	8.4	0.0	31.4	5.1	0.0	36.0
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.66	1.00		0.45
Lane Grp Cap(c), veh/h	268	1083	480	305	580	603	129	0	507	94	0	496
V/C Ratio(X)	0.96	0.96	0.14	0.97	0.97	0.97	0.93	0.00	0.86	0.79	0.00	1.04
Avail Cap(c_a), veh/h	268	1083	480	305	580	603	129	0	507	121	0	496
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	52.8	42.9	31.7	51.7	41.6	41.6	57.8	0.0	41.0	58.7	0.0	44.7
Incr Delay (d2), s/veh	42.9	19.4	0.6	43.7	29.9	29.2	56.7	0.0	13.9	17.4	0.0	51.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.0	18.1	1.6	12.7	21.1	21.8	5.7	0.0	14.2	2.7	0.0	21.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	95.7	62.3	32.3	95.3	71.4	70.8	114.6	0.0	54.9	76.1	0.0	95.9
LnGrp LOS	F	E	C	F	E	E	F	A	D	E	A	F
Approach Vol, veh/h		1366			1439			558			590	
Approach Delay, s/veh		67.0			76.1			67.7			93.4	
Approach LOS		E			E			E			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	23.3	46.3	14.6	41.2	26.0	43.6	12.1	43.7				
Change Period (Y+Rc), s	* 4.4	* 5.4	5.5	* 5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	* 19	* 41	9.1	* 36	21.5	37.8	8.5	* 37				
Max Q Clear Time (g_c+I1), s	20.0	40.9	10.4	38.0	22.8	38.1	7.1	33.4				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4				

Intersection Summary

HCM 6th Ctrl Delay 74.4

HCM 6th LOS E

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

3: Waterman Rd & Bond Rd

Existing Plus Approved Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	241	531	321	54	631	213	407	285	51	229	352	218
Future Volume (veh/h)	241	531	321	54	631	213	407	285	51	229	352	218
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	287	632	111	64	751	67	485	339	1	273	419	45
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	380	1439	641	316	1373	612	457	573	252	380	494	221
Arrive On Green	0.11	0.41	0.41	0.09	0.39	0.39	0.13	0.16	0.16	0.11	0.14	0.14
Sat Flow, veh/h	3456	3554	1582	3456	3554	1585	3456	3554	1564	3456	3554	1585
Grp Volume(v), veh/h	287	632	111	64	751	67	485	339	1	273	419	45
Grp Sat Flow(s),veh/h/ln	1728	1777	1582	1728	1777	1585	1728	1777	1564	1728	1777	1585
Q Serve(g_s), s	8.1	12.9	4.5	1.7	16.4	2.7	13.2	8.8	0.1	7.6	11.5	2.5
Cycle Q Clear(g_c), s	8.1	12.9	4.5	1.7	16.4	2.7	13.2	8.8	0.1	7.6	11.5	2.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	380	1439	641	316	1373	612	457	573	252	380	494	221
V/C Ratio(X)	0.75	0.44	0.17	0.20	0.55	0.11	1.06	0.59	0.00	0.72	0.85	0.20
Avail Cap(c_a), veh/h	381	1439	641	381	1373	612	457	1402	617	443	1387	619
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.1	21.5	19.0	42.0	23.8	19.6	43.3	38.8	35.2	43.0	42.0	38.1
Incr Delay (d2), s/veh	7.5	1.0	0.6	0.1	1.6	0.4	59.6	0.4	0.0	3.5	1.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	5.2	1.6	0.7	6.7	1.0	9.2	3.7	0.0	3.3	4.9	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.6	22.5	19.6	42.1	25.4	20.0	102.9	39.2	35.2	46.4	43.5	38.3
LnGrp LOS	D	C	B	D	C	B	F	D	D	D	D	D
Approach Vol, veh/h	1030			882			825			737		
Approach Delay, s/veh	30.0			26.2			76.7			44.3		
Approach LOS	C			C			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.8	44.4	19.0	19.7	14.9	46.3	16.8	21.9				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	11.0	38.6	13.2	39.0	11.0	38.6	12.8	39.4				
Max Q Clear Time (g_c+I1), s	10.1	18.4	15.2	13.5	3.7	14.9	9.6	10.8				
Green Ext Time (p_c), s	0.0	0.8	0.0	0.4	0.0	0.6	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay				43.2								
HCM 6th LOS				D								
Notes												
User approved ignoring U-Turning movement.												

HCM 6th Signalized Intersection Summary

4: Elk Grove Florin Rd & Sheldon Rd

Existing Plus Approved Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	411	338	133	193	536	152	118	657	77	166	769	454
Future Volume (veh/h)	411	338	133	193	536	152	118	657	77	166	769	454
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	447	367	27	210	583	24	128	714	84	180	836	293
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	491	820	366	335	660	294	294	1278	570	301	1846	573
Arrive On Green	0.14	0.23	0.23	0.10	0.19	0.19	0.09	0.36	0.36	0.09	0.36	0.36
Sat Flow, veh/h	3428	3526	1572	3428	3526	1572	3428	3526	1572	3428	5066	1572
Grp Volume(v), veh/h	447	367	27	210	583	24	128	714	84	180	836	293
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1714	1763	1572	1714	1763	1572	1714	1689	1572
Q Serve(g_s), s	13.1	9.1	1.4	6.0	16.4	1.3	3.6	16.5	3.7	5.2	12.8	14.9
Cycle Q Clear(g_c), s	13.1	9.1	1.4	6.0	16.4	1.3	3.6	16.5	3.7	5.2	12.8	14.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	491	820	366	335	660	294	294	1278	570	301	1846	573
V/C Ratio(X)	0.91	0.45	0.07	0.63	0.88	0.08	0.43	0.56	0.15	0.60	0.45	0.51
Avail Cap(c_a), veh/h	491	1503	670	440	1451	647	302	1278	570	302	1846	573
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.1	33.5	30.6	44.2	40.4	34.2	44.3	26.0	21.9	44.8	24.7	25.3
Incr Delay (d2), s/veh	20.7	0.1	0.0	0.7	1.6	0.0	0.4	1.8	0.5	2.3	0.8	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	3.8	0.5	2.5	7.0	0.5	1.5	6.8	1.4	2.2	5.0	5.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.8	33.7	30.6	45.0	42.0	34.3	44.7	27.8	22.4	47.1	25.5	28.6
LnGrp LOS	E	C	C	D	D	C	D	C	C	D	C	C
Approach Vol, veh/h	841			817			926			1309		
Approach Delay, s/veh	49.6			42.5			29.6			29.1		
Approach LOS	D			D			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.6	43.0	20.0	24.5	14.7	42.8	15.4	29.1				
Change Period (Y+Rc), s	5.8	5.8	5.4	5.4	5.8	5.8	5.4	5.4				
Max Green Setting (Gmax), s	9.0	37.0	14.6	42.0	9.0	37.0	13.1	43.5				
Max Q Clear Time (g_c+I1), s	5.6	16.9	15.1	18.4	7.2	18.5	8.0	11.1				
Green Ext Time (p_c), s	0.0	0.9	0.0	0.7	0.0	0.7	0.0	0.4				
Intersection Summary												
HCM 6th Ctrl Delay	36.5											
HCM 6th LOS	D											

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon AM Peak Hour (Site Folder: EAP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Bradshaw Road															
3	L2	All MCs	71	3.0	71	3.0	0.601	9.5	LOS A	5.7	146.8	0.70	0.63	1.01	31.2
8	T1	All MCs	991	3.0	991	3.0	0.601	10.1	LOS B	5.7	146.8	0.66	0.56	0.89	32.3
18	R2	All MCs	168	3.0	168	3.0	0.304	5.3	LOS A	1.4	35.4	0.51	0.36	0.51	33.6
Approach			1230	3.0	1230	3.0	0.601	9.4	LOS A	5.7	146.8	0.64	0.54	0.85	32.4
East: Sheldon Road															
1	L2	All MCs	195	3.0	195	3.0	1.037	83.3	LOS F	15.7	400.9	1.00	2.01	4.68	15.4
6	T1	All MCs	223	3.0	223	3.0	1.037	83.3	LOS F	15.7	400.9	1.00	2.01	4.68	15.6
16	R2	All MCs	25	3.0	25	3.0	1.037	90.1	LOS F	15.7	400.9	1.00	2.01	4.68	15.5
Approach			442	3.0	442	3.0	1.037	83.7	LOS F	15.7	400.9	1.00	2.01	4.68	15.5
North: Bradshaw Road															
7	L2	All MCs	31	3.0	31	3.0	0.623	9.8	LOS A	6.4	165.1	0.72	0.65	1.05	31.1
4	T1	All MCs	913	3.0	913	3.0	0.623	9.9	LOS A	6.4	165.1	0.70	0.62	1.00	31.9
14	R2	All MCs	349	3.0	349	3.0	0.315	5.4	LOS A	1.5	37.3	0.51	0.35	0.51	33.4
Approach			1294	3.0	1294	3.0	0.623	8.7	LOS A	6.4	165.1	0.65	0.55	0.87	32.3
West: Sheldon Road															
5	L2	All MCs	289	3.0	289	3.0	0.806	28.1	LOS D	6.6	168.7	0.89	1.20	1.97	24.2
2	T1	All MCs	174	3.0	174	3.0	0.806	28.1	LOS D	6.6	168.7	0.89	1.20	1.97	24.6
12	R2	All MCs	59	3.0	59	3.0	0.806	33.3	LOS D	6.6	168.7	0.89	1.20	1.97	24.5
Approach			523	3.0	523	3.0	0.806	28.7	LOS D	6.6	168.7	0.89	1.20	1.97	24.4
All Vehicles			3488	3.0	3488	3.0	1.037	21.4	LOS C	15.7	400.9	0.73	0.83	1.51	27.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\3_Existing Plus Approved Project\Summer_Villas.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon PM Peak Hour (Site Folder: EAP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Waterman Road															
3	L2	All MCs	137	1.0	137	1.0	0.663	13.8	LOS B	7.5	190.1	0.83	0.83	1.33	29.1
8	T1	All MCs	352	1.0	352	1.0	0.663	13.8	LOS B	7.5	190.1	0.83	0.83	1.33	29.6
18	R2	All MCs	153	1.0	153	1.0	0.663	13.8	LOS B	7.5	190.1	0.83	0.83	1.33	29.4
Approach			641	1.0	641	1.0	0.663	13.8	LOS B	7.5	190.1	0.83	0.83	1.33	29.4
East: Sheldon Road															
1	L2	All MCs	199	1.0	199	1.0	0.818	23.9	LOS C	12.1	305.4	0.99	1.21	2.08	25.7
6	T1	All MCs	471	1.0	471	1.0	0.818	23.9	LOS C	12.1	305.4	0.99	1.21	2.08	26.1
16	R2	All MCs	19	1.0	19	1.0	0.818	23.9	LOS C	12.1	305.4	0.99	1.21	2.08	25.9
Approach			689	1.0	689	1.0	0.818	23.9	LOS C	12.1	305.4	0.99	1.21	2.08	26.0
North: Waterman Road															
7	L2	All MCs	27	1.0	27	1.0	0.708	21.4	LOS C	5.6	141.7	0.85	1.00	1.51	26.8
4	T1	All MCs	425	1.0	425	1.0	0.708	21.4	LOS C	5.6	141.7	0.85	1.00	1.51	27.3
14	R2	All MCs	228	1.0	228	1.0	0.357	10.5	LOS B	1.6	40.4	0.69	0.67	0.79	30.9
Approach			680	1.0	680	1.0	0.708	17.7	LOS C	5.6	141.7	0.80	0.89	1.27	28.3
West: Sheldon Road															
5	L2	All MCs	127	1.0	127	1.0	0.535	9.4	LOS A	4.2	104.7	0.75	0.69	1.02	30.8
2	T1	All MCs	320	1.0	320	1.0	0.535	9.4	LOS A	4.2	104.7	0.75	0.69	1.02	31.4
12	R2	All MCs	160	1.0	160	1.0	0.535	9.4	LOS A	4.2	104.7	0.75	0.69	1.02	31.2
Approach			608	1.0	608	1.0	0.535	9.4	LOS A	4.2	104.7	0.75	0.69	1.02	31.2
All Vehicles			2617	1.0	2617	1.0	0.818	16.5	LOS C	12.1	305.4	0.84	0.91	1.44	28.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\3_Existing Plus Approved Project\Summer_Villas.sip9

HCM 6th Signalized Intersection Summary

2: Waterman Rd & Calvin Rd

Existing Plus Approved Project PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	196	702	207	275	800	30	116	209	142	25	183	171
Future Volume (veh/h)	196	702	207	275	800	30	116	209	142	25	183	171
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	228	816	35	320	930	35	135	243	165	29	213	199
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	257	945	422	348	1109	42	160	345	234	36	232	217
Arrive On Green	0.14	0.26	0.26	0.19	0.32	0.32	0.09	0.33	0.33	0.02	0.26	0.26
Sat Flow, veh/h	1795	3582	1598	1795	3519	132	1795	1046	710	1795	890	831
Grp Volume(v), veh/h	228	816	35	320	473	492	135	0	408	29	0	412
Grp Sat Flow(s),veh/h/ln	1795	1791	1598	1795	1791	1861	1795	0	1757	1795	0	1721
Q Serve(g_s), s	13.3	23.2	1.8	18.7	26.3	26.3	7.9	0.0	21.7	1.7	0.0	24.9
Cycle Q Clear(g_c), s	13.3	23.2	1.8	18.7	26.3	26.3	7.9	0.0	21.7	1.7	0.0	24.9
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.40	1.00		0.48
Lane Grp Cap(c), veh/h	257	945	422	348	565	587	160	0	579	36	0	448
V/C Ratio(X)	0.89	0.86	0.08	0.92	0.84	0.84	0.85	0.00	0.70	0.80	0.00	0.92
Avail Cap(c_a), veh/h	272	945	422	348	565	587	160	0	649	103	0	580
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	44.9	37.5	29.6	42.3	34.0	34.0	47.9	0.0	31.3	52.1	0.0	38.4
Incr Delay (d2), s/veh	25.5	10.3	0.4	28.5	13.9	13.4	30.7	0.0	2.3	14.1	0.0	15.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.5	11.0	0.7	10.7	12.9	13.4	4.8	0.0	9.1	0.9	0.0	11.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.4	47.8	30.0	70.7	47.9	47.5	78.6	0.0	33.6	66.2	0.0	53.4
LnGrp LOS	E	D	C	E	D	D	E	A	C	E	A	D
Approach Vol, veh/h		1079			1285			543			441	
Approach Delay, s/veh		52.0			53.4			44.8			54.3	
Approach LOS		D			D			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.7	39.1	15.0	33.0	25.2	33.6	7.6	40.4				
Change Period (Y+Rc), s	* 4.4	* 5.4	5.5	* 5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	* 16	* 33	9.5	* 36	20.7	28.2	6.1	* 40				
Max Q Clear Time (g_c+I1), s	15.3	28.3	9.9	26.9	20.7	25.2	3.7	23.7				
Green Ext Time (p_c), s	0.0	1.0	0.0	0.6	0.0	0.8	0.0	0.7				

Intersection Summary

HCM 6th Ctrl Delay 51.7
HCM 6th LOS D

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary

3: Waterman Rd & Bond Rd

Existing Plus Approved Project PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	179	550	234	82	571	141	180	301	79	173	364	250
Future Volume (veh/h)	179	550	234	82	571	141	180	301	79	173	364	250
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	181	556	99	83	577	56	182	304	12	175	368	38
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	391	1494	657	352	1454	648	391	471	209	390	470	210
Arrive On Green	0.11	0.42	0.42	0.10	0.41	0.41	0.11	0.13	0.13	0.11	0.13	0.13
Sat Flow, veh/h	3483	3582	1574	3483	3582	1595	3483	3582	1590	3483	3582	1598
Grp Volume(v), veh/h	181	556	99	83	577	56	182	304	12	175	368	38
Grp Sat Flow(s),veh/h/ln	1742	1791	1574	1742	1791	1595	1742	1791	1590	1742	1791	1598
Q Serve(g_s), s	4.7	10.4	3.8	2.1	11.1	2.1	4.8	7.8	0.6	4.6	9.7	2.1
Cycle Q Clear(g_c), s	4.7	10.4	3.8	2.1	11.1	2.1	4.8	7.8	0.6	4.6	9.7	2.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	391	1494	657	352	1454	648	391	471	209	390	470	210
V/C Ratio(X)	0.46	0.37	0.15	0.24	0.40	0.09	0.47	0.65	0.06	0.45	0.78	0.18
Avail Cap(c_a), veh/h	412	1494	657	394	1454	648	415	1454	646	405	1443	644
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.4	19.6	17.6	40.3	20.5	17.8	40.5	40.1	37.0	40.4	40.9	37.6
Incr Delay (d2), s/veh	0.3	0.7	0.5	0.1	0.8	0.3	0.3	0.6	0.0	0.3	1.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	4.2	1.4	0.9	4.5	0.8	2.0	3.3	0.2	1.9	4.2	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	40.8	20.3	18.1	40.4	21.3	18.1	40.8	40.7	37.0	40.7	42.0	37.8
LnGrp LOS	D	C	B	D	C	B	D	D	D	D	D	D
Approach Vol, veh/h	836			716			498			581		
Approach Delay, s/veh	24.5			23.2			40.6			41.3		
Approach LOS	C			C			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.7	45.3	16.7	18.6	15.6	46.4	16.7	18.6				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	11.5	39.5	11.6	39.2	11.0	40.0	11.3	39.5				
Max Q Clear Time (g_c+I1), s	6.7	13.1	6.8	11.7	4.1	12.4	6.6	9.8				
Green Ext Time (p_c), s	0.0	0.6	0.0	0.4	0.0	0.5	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay	30.9											
HCM 6th LOS	C											
Notes												

HCM 6th Signalized Intersection Summary

4: Elk Grove Florin Rd & Sheldon Rd

Existing Plus Approved Project PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	420	398	120	156	564	72	123	667	120	143	782	431
Future Volume (veh/h)	420	398	120	156	564	72	123	667	120	143	782	431
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	452	428	25	168	606	12	132	717	129	154	841	278
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	487	870	388	331	710	315	294	1269	566	297	1829	568
Arrive On Green	0.14	0.24	0.24	0.10	0.20	0.20	0.08	0.36	0.36	0.09	0.36	0.36
Sat Flow, veh/h	3456	3554	1585	3456	3554	1578	3456	3554	1584	3456	5106	1585
Grp Volume(v), veh/h	452	428	25	168	606	12	132	717	129	154	841	278
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1578	1728	1777	1584	1728	1702	1585
Q Serve(g_s), s	13.4	10.7	1.3	4.8	17.0	0.6	3.8	16.8	5.9	4.4	13.1	14.1
Cycle Q Clear(g_c), s	13.4	10.7	1.3	4.8	17.0	0.6	3.8	16.8	5.9	4.4	13.1	14.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	487	870	388	331	710	315	294	1269	566	297	1829	568
V/C Ratio(X)	0.93	0.49	0.06	0.51	0.85	0.04	0.45	0.56	0.23	0.52	0.46	0.49
Avail Cap(c_a), veh/h	487	1558	695	374	1441	640	300	1269	566	300	1829	568
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.0	33.6	30.0	44.5	40.0	33.4	45.1	26.8	23.3	45.3	25.5	25.9
Incr Delay (d2), s/veh	23.8	0.2	0.0	0.4	1.2	0.0	0.4	1.8	0.9	0.7	0.8	3.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	4.5	0.5	2.0	7.3	0.2	1.6	7.0	2.3	1.9	5.1	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.8	33.7	30.0	45.0	41.1	33.4	45.5	28.6	24.2	46.0	26.4	28.9
LnGrp LOS	E	C	C	D	D	C	D	C	C	D	C	C
Approach Vol, veh/h					786				978			
Approach Delay, s/veh	50.6				41.8				30.3			
Approach LOS	D				D				C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.6	42.9	20.0	26.1	14.7	42.8	15.3	30.8				
Change Period (Y+Rc), s	5.8	5.8	5.4	5.4	5.8	5.8	5.4	5.4				
Max Green Setting (Gmax), s	9.0	37.0	14.6	42.0	9.0	37.0	11.2	45.4				
Max Q Clear Time (g_c+I1), s	5.8	16.1	15.4	19.0	6.4	18.8	6.8	12.7				
Green Ext Time (p_c), s	0.0	0.9	0.0	0.7	0.0	0.7	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	37.0
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon PM Peak Hour (Site Folder: EAP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Bradshaw Road															
3	L2	All MCs	39	3.0	39	3.0	0.576	11.4	LOS B	4.6	118.7	0.73	0.70	1.07	30.4
8	T1	All MCs	651	3.0	651	3.0	0.576	11.3	LOS B	4.6	118.7	0.69	0.65	0.97	31.4
18	R2	All MCs	149	3.0	149	3.0	0.291	6.7	LOS A	1.2	31.9	0.56	0.44	0.56	32.9
Approach			839	3.0	839	3.0	0.576	10.5	LOS B	4.6	118.7	0.67	0.61	0.90	31.6
East: Sheldon Road															
1	L2	All MCs	67	3.0	67	3.0	0.962	70.6	LOS F	11.6	296.5	0.98	1.60	3.18	16.9
6	T1	All MCs	249	3.0	249	3.0	0.962	70.6	LOS F	11.6	296.5	0.98	1.60	3.18	17.1
16	R2	All MCs	30	3.0	30	3.0	0.962	75.0	LOS F	11.6	296.5	0.98	1.60	3.18	17.1
Approach			346	3.0	346	3.0	0.962	71.0	LOS F	11.6	296.5	0.98	1.60	3.18	17.1
North: Bradshaw Road															
7	L2	All MCs	39	3.0	39	3.0	0.614	9.4	LOS A	6.3	162.3	0.67	0.53	0.88	31.3
4	T1	All MCs	890	3.0	890	3.0	0.614	9.4	LOS A	6.3	162.3	0.65	0.51	0.86	32.0
14	R2	All MCs	392	3.0	392	3.0	0.311	5.2	LOS A	1.5	37.9	0.46	0.29	0.46	33.5
Approach			1321	3.0	1321	3.0	0.614	8.2	LOS A	6.3	162.3	0.60	0.45	0.74	32.4
West: Sheldon Road															
5	L2	All MCs	192	3.0	192	3.0	0.764	23.4	LOS C	6.2	159.8	0.87	1.11	1.79	25.8
2	T1	All MCs	293	3.0	293	3.0	0.764	23.4	LOS C	6.2	159.8	0.87	1.11	1.79	26.2
12	R2	All MCs	47	3.0	47	3.0	0.764	27.8	LOS D	6.2	159.8	0.87	1.11	1.79	26.0
Approach			532	3.0	532	3.0	0.764	23.8	LOS C	6.2	159.8	0.87	1.11	1.79	26.0
All Vehicles			3038	3.0	3038	3.0	0.962	18.7	LOS C	11.6	296.5	0.71	0.74	1.25	28.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\3_Existing Plus Approved Project\Summer_Villas.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon AM Peak Hour (Site Folder: EAPPP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec			ft				mph
South: Waterman Road															
3	L2	All MCs	223	2.0	223	2.0	0.679	12.7	LOS B	8.3	211.4	0.84	0.82	1.34	29.3
8	T1	All MCs	386	2.0	386	2.0	0.679	12.7	LOS B	8.3	211.4	0.84	0.82	1.34	29.9
18	R2	All MCs	173	2.0	173	2.0	0.679	12.7	LOS B	8.3	211.4	0.84	0.82	1.34	29.7
Approach			782	2.0	782	2.0	0.679	12.7	LOS B	8.3	211.4	0.84	0.82	1.34	29.7
East: Sheldon Road															
1	L2	All MCs	188	2.0	188	2.0	1.126	95.7	LOS F	41.5	1053.4	1.00	2.75	6.30	14.2
6	T1	All MCs	511	2.0	511	2.0	1.126	95.7	LOS F	41.5	1053.4	1.00	2.75	6.30	14.4
16	R2	All MCs	54	2.0	54	2.0	1.126	95.7	LOS F	41.5	1053.4	1.00	2.75	6.30	14.3
Approach			753	2.0	753	2.0	1.126	95.7	LOS F	41.5	1053.4	1.00	2.75	6.30	14.3
North: Waterman Road															
7	L2	All MCs	38	2.0	38	2.0	0.841	33.4	LOS D	8.7	220.8	0.93	1.25	2.11	23.4
4	T1	All MCs	464	2.0	464	2.0	0.841	33.4	LOS D	8.7	220.8	0.93	1.25	2.11	23.8
14	R2	All MCs	205	2.0	205	2.0	0.344	10.8	LOS B	1.5	37.2	0.69	0.69	0.79	30.8
Approach			707	2.0	707	2.0	0.841	26.9	LOS D	8.7	220.8	0.86	1.09	1.73	25.4
West: Sheldon Road															
5	L2	All MCs	141	2.0	141	2.0	0.743	19.3	LOS C	8.2	207.4	0.91	1.05	1.69	27.1
2	T1	All MCs	311	2.0	311	2.0	0.743	19.3	LOS C	8.2	207.4	0.91	1.05	1.69	27.6
12	R2	All MCs	157	2.0	157	2.0	0.743	19.3	LOS C	8.2	207.4	0.91	1.05	1.69	27.4
Approach			608	2.0	608	2.0	0.743	19.3	LOS C	8.2	207.4	0.91	1.05	1.69	27.4
All Vehicles			2851	2.0	2851	2.0	1.126	39.5	LOS E	41.5	1053.4	0.90	1.45	2.82	22.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\4_Existing Plus Approved Project Plus Project\Summer_Villas.sip9

HCM 6th Signalized Intersection Summary 2: Waterman Rd & Calvin Rd

Existing Plus Approved Project Plus Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	236	957	174	273	1015	36	120	164	270	68	265	214
Future Volume (veh/h)	236	957	174	273	1015	36	120	164	270	68	265	214
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	257	1040	78	297	1103	39	130	178	293	74	288	233
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	271	1136	504	303	1184	42	138	192	316	93	268	217
Arrive On Green	0.15	0.32	0.32	0.17	0.34	0.34	0.08	0.31	0.31	0.05	0.28	0.28
Sat Flow, veh/h	1781	3554	1575	1781	3501	124	1781	628	1034	1781	956	773
Grp Volume(v), veh/h	257	1040	78	297	560	582	130	0	471	74	0	521
Grp Sat Flow(s),veh/h/ln	1781	1777	1575	1781	1777	1848	1781	0	1663	1781	0	1729
Q Serve(g_s), s	19.4	38.1	4.8	22.5	41.2	41.2	9.8	0.0	37.1	5.6	0.0	38.0
Cycle Q Clear(g_c), s	19.4	38.1	4.8	22.5	41.2	41.2	9.8	0.0	37.1	5.6	0.0	38.0
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.62	1.00		0.45
Lane Grp Cap(c), veh/h	271	1136	504	303	601	625	138	0	508	93	0	485
V/C Ratio(X)	0.95	0.92	0.15	0.98	0.93	0.93	0.94	0.00	0.93	0.79	0.00	1.07
Avail Cap(c_a), veh/h	271	1136	504	303	601	625	138	0	510	93	0	485
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	56.9	44.3	33.0	56.0	43.3	43.3	62.1	0.0	45.5	63.4	0.0	48.7
Incr Delay (d2), s/veh	40.3	12.8	0.7	46.4	23.2	22.6	58.1	0.0	22.7	33.5	0.0	62.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	18.2	1.9	13.8	21.3	22.1	6.6	0.0	18.0	3.3	0.0	24.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	97.2	57.1	33.6	102.4	66.5	65.9	120.3	0.0	68.2	97.0	0.0	110.7
LnGrp LOS	F	E	C	F	E	E	F	A	E	F	A	F
Approach Vol, veh/h	1375			1439			601			595		
Approach Delay, s/veh	63.2			73.7			79.5			109.0		
Approach LOS	E			E			E			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	25.0	51.2	16.0	43.2	27.5	48.7	12.6	46.6				
Change Period (Y+Rc), s	* 4.4	* 5.4	5.5	* 5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	* 21	* 46	10.5	* 38	23.0	42.9	7.1	* 42				
Max Q Clear Time (g_c+I1), s	21.4	43.2	11.8	40.0	24.5	40.1	7.6	39.1				
Green Ext Time (p_c), s	0.0	0.8	0.0	0.0	0.0	1.0	0.0	0.3				

Intersection Summary

HCM 6th Ctrl Delay 76.2

HCM 6th LOS E

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary 3: Waterman Rd & Bond Rd

Existing Plus Approved Project Plus Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	246	531	321	54	631	213	407	290	51	239	372	249
Future Volume (veh/h)	246	531	321	54	631	213	407	290	51	239	372	249
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	293	632	109	64	751	66	485	345	1	285	443	83
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	378	1427	635	315	1363	608	453	596	262	377	518	231
Arrive On Green	0.11	0.40	0.40	0.09	0.38	0.38	0.13	0.17	0.17	0.11	0.15	0.15
Sat Flow, veh/h	3456	3554	1581	3456	3554	1585	3456	3554	1564	3456	3554	1585
Grp Volume(v), veh/h	293	632	109	64	751	66	485	345	1	285	443	83
Grp Sat Flow(s),veh/h/ln	1728	1777	1581	1728	1777	1585	1728	1777	1564	1728	1777	1585
Q Serve(g_s), s	8.3	13.0	4.5	1.7	16.6	2.7	13.2	9.0	0.1	8.1	12.2	4.8
Cycle Q Clear(g_c), s	8.3	13.0	4.5	1.7	16.6	2.7	13.2	9.0	0.1	8.1	12.2	4.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	378	1427	635	315	1363	608	453	596	262	377	518	231
V/C Ratio(X)	0.78	0.44	0.17	0.20	0.55	0.11	1.07	0.58	0.00	0.75	0.86	0.36
Avail Cap(c_a), veh/h	378	1427	635	378	1363	608	453	1370	603	460	1377	614
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	43.6	21.9	19.4	42.4	24.3	20.0	43.7	38.6	34.9	43.5	42.0	38.8
Incr Delay (d2), s/veh	8.9	1.0	0.6	0.1	1.6	0.4	62.3	0.3	0.0	4.2	1.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	5.3	1.6	0.7	6.8	1.0	9.3	3.8	0.0	3.5	5.3	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.6	22.9	19.9	42.5	25.9	20.3	106.1	39.0	34.9	47.8	43.6	39.1
LnGrp LOS	D	C	B	D	C	C	F	D	C	D	D	D
Approach Vol, veh/h	1034			881			831			811		
Approach Delay, s/veh	31.0			26.7			78.1			44.6		
Approach LOS	C			C			E			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.8	44.4	19.0	20.5	15.0	46.2	16.8	22.7				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	11.0	38.6	13.2	39.0	11.0	38.6	13.4	38.8				
Max Q Clear Time (g_c+I1), s	10.3	18.6	15.2	14.2	3.7	15.0	10.1	11.0				
Green Ext Time (p_c), s	0.0	0.8	0.0	0.4	0.0	0.6	0.0	0.3				

Intersection Summary

HCM 6th Ctrl Delay	44.0
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

HCM 6th Signalized Intersection Summary

4: Elk Grove Florin Rd & Sheldon Rd

Existing Plus Approved Project Plus Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	411	347	133	199	597	154	118	657	78	166	769	454
Future Volume (veh/h)	411	347	133	199	597	154	118	657	78	166	769	454
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	447	377	29	216	649	34	128	714	85	180	836	291
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	479	880	393	328	724	323	288	1249	557	294	1804	560
Arrive On Green	0.14	0.25	0.25	0.10	0.21	0.21	0.08	0.35	0.35	0.09	0.36	0.36
Sat Flow, veh/h	3428	3526	1572	3428	3526	1572	3428	3526	1572	3428	5066	1572
Grp Volume(v), veh/h	447	377	29	216	649	34	128	714	85	180	836	291
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1714	1763	1572	1714	1763	1572	1714	1689	1572
Q Serve(g_s), s	13.5	9.4	1.5	6.3	18.7	1.8	3.7	17.1	3.9	5.3	13.3	15.3
Cycle Q Clear(g_c), s	13.5	9.4	1.5	6.3	18.7	1.8	3.7	17.1	3.9	5.3	13.3	15.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	479	880	393	328	724	323	288	1249	557	294	1804	560
V/C Ratio(X)	0.93	0.43	0.07	0.66	0.90	0.11	0.44	0.57	0.15	0.61	0.46	0.52
Avail Cap(c_a), veh/h	479	1449	646	450	1418	633	296	1249	557	296	1804	560
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.4	32.9	29.9	45.6	40.4	33.7	45.5	27.3	23.0	46.1	25.9	26.6
Incr Delay (d2), s/veh	24.9	0.1	0.0	0.8	1.7	0.1	0.4	1.9	0.6	2.7	0.9	3.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	3.9	0.5	2.7	8.0	0.7	1.5	7.1	1.5	2.3	5.2	6.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.3	33.0	30.0	46.4	42.0	33.7	45.9	29.2	23.6	48.7	26.8	30.0
LnGrp LOS	E	C	C	D	D	C	D	C	C	D	C	C
Approach Vol, veh/h	853				899				927			
Approach Delay, s/veh	51.9				42.8				31.0			
Approach LOS	D				D				C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.6	43.0	20.0	26.9	14.8	42.8	15.4	31.5				
Change Period (Y+Rc), s	5.8	5.8	5.4	5.4	5.8	5.8	5.4	5.4				
Max Green Setting (Gmax), s	9.0	37.0	14.6	42.0	9.0	37.0	13.7	42.9				
Max Q Clear Time (g_c+I1), s	5.7	17.3	15.5	20.7	7.3	19.1	8.3	11.4				
Green Ext Time (p_c), s	0.0	0.9	0.0	0.7	0.0	0.7	0.0	0.4				

Intersection Summary

HCM 6th Ctrl Delay	38.0
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon AM Peak Hour (Site Folder: EAPPP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Bradshaw Road															
3	L2	All MCs	71	3.0	71	3.0	0.614	9.9	LOS A	6.0	152.7	0.72	0.67	1.07	31.0
8	T1	All MCs	991	3.0	991	3.0	0.614	10.5	LOS B	6.0	152.7	0.68	0.60	0.94	32.1
18	R2	All MCs	168	3.0	168	3.0	0.310	5.4	LOS A	1.4	36.0	0.53	0.38	0.53	33.5
Approach			1230	3.0	1230	3.0	0.614	9.8	LOS A	6.0	152.7	0.66	0.57	0.89	32.2
East: Sheldon Road															
1	L2	All MCs	195	3.0	195	3.0	1.059	90.3	LOS F	17.3	443.4	1.00	2.12	5.10	14.7
6	T1	All MCs	224	3.0	224	3.0	1.059	90.3	LOS F	17.3	443.4	1.00	2.12	5.10	14.9
16	R2	All MCs	25	3.0	25	3.0	1.059	97.2	LOS F	17.3	443.4	1.00	2.12	5.10	14.8
Approach			443	3.0	443	3.0	1.059	90.7	LOS F	17.3	443.4	1.00	2.12	5.10	14.8
North: Bradshaw Road															
7	L2	All MCs	31	3.0	31	3.0	0.621	9.8	LOS A	6.4	164.4	0.71	0.64	1.04	31.2
4	T1	All MCs	913	3.0	913	3.0	0.621	9.8	LOS A	6.4	164.4	0.69	0.61	0.99	32.0
14	R2	All MCs	353	3.0	353	3.0	0.314	5.3	LOS A	1.5	37.2	0.51	0.35	0.51	33.4
Approach			1297	3.0	1297	3.0	0.621	8.6	LOS A	6.4	164.4	0.64	0.54	0.86	32.3
West: Sheldon Road															
5	L2	All MCs	309	3.0	309	3.0	0.849	32.4	LOS D	7.9	203.3	0.91	1.30	2.26	23.2
2	T1	All MCs	183	3.0	183	3.0	0.849	32.4	LOS D	7.9	203.3	0.91	1.30	2.26	23.5
12	R2	All MCs	61	3.0	61	3.0	0.849	37.7	LOS E	7.9	203.3	0.91	1.30	2.26	23.4
Approach			553	3.0	553	3.0	0.849	33.0	LOS D	7.9	203.3	0.91	1.30	2.26	23.3
All Vehicles			3523	3.0	3523	3.0	1.059	23.2	LOS C	17.3	443.4	0.74	0.87	1.62	26.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\4_Existing Plus Approved Project Plus Project\Summer_Villas.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon PM Peak Hour (Site Folder: EAPPP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Waterman Road															
3	L2	All MCs	140	1.0	140	1.0	0.745	18.2	LOS C	9.5	239.8	0.92	1.02	1.68	27.5
8	T1	All MCs	355	1.0	355	1.0	0.745	18.2	LOS C	9.5	239.8	0.92	1.02	1.68	28.0
18	R2	All MCs	168	1.0	168	1.0	0.745	18.2	LOS C	9.5	239.8	0.92	1.02	1.68	27.8
Approach			662	1.0	662	1.0	0.745	18.2	LOS C	9.5	239.8	0.92	1.02	1.68	27.9
East: Sheldon Road															
1	L2	All MCs	206	1.0	206	1.0	0.871	29.1	LOS D	15.2	383.3	1.00	1.37	2.41	24.3
6	T1	All MCs	492	1.0	492	1.0	0.871	29.1	LOS D	15.2	383.3	1.00	1.37	2.41	24.6
16	R2	All MCs	30	1.0	30	1.0	0.871	29.1	LOS D	15.2	383.3	1.00	1.37	2.41	24.5
Approach			729	1.0	729	1.0	0.871	29.1	LOS D	15.2	383.3	1.00	1.37	2.41	24.5
North: Waterman Road															
7	L2	All MCs	55	1.0	55	1.0	0.791	27.8	LOS D	7.3	184.0	0.90	1.14	1.81	24.9
4	T1	All MCs	434	1.0	434	1.0	0.791	27.8	LOS D	7.3	184.0	0.90	1.14	1.81	25.3
14	R2	All MCs	228	1.0	228	1.0	0.369	11.0	LOS B	1.7	41.9	0.70	0.70	0.82	30.7
Approach			717	1.0	717	1.0	0.791	22.4	LOS C	7.3	184.0	0.84	1.00	1.50	26.7
West: Sheldon Road															
5	L2	All MCs	127	1.0	127	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.1
2	T1	All MCs	377	1.0	377	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.6
12	R2	All MCs	170	1.0	170	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.4
Approach			674	1.0	674	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.5
All Vehicles			2783	1.0	2783	1.0	0.871	20.5	LOS C	15.2	383.3	0.89	1.05	1.72	27.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\4_Existing Plus Approved Project Plus Project\Summer_Villas.sip9

HCM 6th Signalized Intersection Summary 2: Waterman Rd & Calvin Rd

Existing Plus Approved Project Plus Project PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	196	702	216	277	800	30	119	219	143	25	209	171
Future Volume (veh/h)	196	702	216	277	800	30	119	219	143	25	209	171
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	228	816	32	322	930	35	138	255	166	29	243	199
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	257	907	405	349	1076	40	157	365	238	36	262	214
Arrive On Green	0.14	0.25	0.25	0.19	0.31	0.31	0.09	0.34	0.34	0.02	0.27	0.27
Sat Flow, veh/h	1795	3582	1598	1795	3519	132	1795	1066	694	1795	952	779
Grp Volume(v), veh/h	228	816	32	322	473	492	138	0	421	29	0	442
Grp Sat Flow(s),veh/h/ln	1795	1791	1598	1795	1791	1861	1795	0	1760	1795	0	1731
Q Serve(g_s), s	13.5	23.9	1.7	19.1	27.1	27.1	8.3	0.0	22.5	1.7	0.0	27.0
Cycle Q Clear(g_c), s	13.5	23.9	1.7	19.1	27.1	27.1	8.3	0.0	22.5	1.7	0.0	27.0
Prop In Lane	1.00		1.00	1.00		0.07	1.00		0.39	1.00		0.45
Lane Grp Cap(c), veh/h	257	907	405	349	548	569	157	0	602	36	0	476
V/C Ratio(X)	0.89	0.90	0.08	0.92	0.86	0.86	0.88	0.00	0.70	0.80	0.00	0.93
Avail Cap(c_a), veh/h	268	907	405	355	548	569	157	0	640	101	0	574
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	45.7	39.2	30.9	42.9	35.6	35.6	49.0	0.0	30.9	53.0	0.0	38.3
Incr Delay (d2), s/veh	26.5	13.6	0.4	28.0	16.5	16.0	38.0	0.0	2.5	14.0	0.0	18.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	11.7	0.7	10.9	13.7	14.1	5.2	0.0	9.4	0.9	0.0	13.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	72.1	52.8	31.3	70.9	52.1	51.5	87.0	0.0	33.4	67.0	0.0	56.5
LnGrp LOS	E	D	C	E	D	D	F	A	C	E	A	E
Approach Vol, veh/h	1076			1287			559			471		
Approach Delay, s/veh	56.3			56.6			46.6			57.1		
Approach LOS	E			E			D			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.9	38.6	15.0	35.1	25.6	32.9	7.7	42.4				
Change Period (Y+Rc), s	* 4.4	* 5.4	5.5	* 5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	* 16	* 33	9.5	* 36	21.5	27.4	6.1	* 40				
Max Q Clear Time (g_c+l1), s	15.5	29.1	10.3	29.0	21.1	25.9	3.7	24.5				
Green Ext Time (p_c), s	0.0	0.9	0.0	0.6	0.0	0.4	0.0	0.7				

Intersection Summary

HCM 6th Ctrl Delay 54.9

HCM 6th LOS D

Notes

User approved ignoring U-Turning movement.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary 3: Waterman Rd & Bond Rd

Existing Plus Approved Project Plus Project PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	207	550	234	82	571	141	180	327	79	176	371	261
Future Volume (veh/h)	207	550	234	82	571	141	180	327	79	176	371	261
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	209	556	99	83	577	55	182	330	12	178	375	41
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	393	1483	652	353	1442	642	392	477	212	391	477	213
Arrive On Green	0.11	0.41	0.41	0.10	0.40	0.40	0.11	0.13	0.13	0.11	0.13	0.13
Sat Flow, veh/h	3483	3582	1574	3483	3582	1595	3483	3582	1590	3483	3582	1598
Grp Volume(v), veh/h	209	556	99	83	577	55	182	330	12	178	375	41
Grp Sat Flow(s),veh/h/ln	1742	1791	1574	1742	1791	1595	1742	1791	1590	1742	1791	1598
Q Serve(g_s), s	5.5	10.4	3.8	2.1	11.1	2.1	4.7	8.5	0.6	4.6	9.8	2.2
Cycle Q Clear(g_c), s	5.5	10.4	3.8	2.1	11.1	2.1	4.7	8.5	0.6	4.6	9.8	2.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	393	1483	652	353	1442	642	392	477	212	391	477	213
V/C Ratio(X)	0.53	0.37	0.15	0.24	0.40	0.09	0.46	0.69	0.06	0.45	0.79	0.19
Avail Cap(c_a), veh/h	463	1483	652	395	1442	642	416	1446	642	409	1439	642
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.6	19.7	17.8	40.2	20.7	17.9	40.3	40.2	36.7	40.3	40.7	37.4
Incr Delay (d2), s/veh	0.4	0.7	0.5	0.1	0.8	0.3	0.3	0.7	0.0	0.3	1.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	4.2	1.4	0.9	4.5	0.8	2.0	3.6	0.2	1.9	4.2	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	41.0	20.4	18.3	40.3	21.5	18.2	40.7	40.8	36.8	40.6	41.8	37.6
LnGrp LOS	D	C	B	D	C	B	D	D	D	D	D	D
Approach Vol, veh/h	864			715			524			594		
Approach Delay, s/veh	25.2			23.4			40.7			41.2		
Approach LOS	C			C			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.8	44.9	16.7	18.7	15.6	46.0	16.7	18.7				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	12.9	38.3	11.6	39.0	11.0	40.2	11.4	39.2				
Max Q Clear Time (g_c+l1), s	7.5	13.1	6.7	11.8	4.1	12.4	6.6	10.5				
Green Ext Time (p_c), s	0.0	0.6	0.0	0.4	0.0	0.5	0.0	0.3				
Intersection Summary												
HCM 6th Ctrl Delay				31.2								
HCM 6th LOS				C								
Notes												
User approved ignoring U-Turning movement.												

HCM 6th Signalized Intersection Summary

4: Elk Grove Florin Rd & Sheldon Rd

Existing Plus Approved Project Plus Project PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	420	452	120	158	585	73	123	667	125	145	782	431
Future Volume (veh/h)	420	452	120	158	585	73	123	667	125	145	782	431
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	452	486	27	170	629	12	132	717	134	156	841	277
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	483	890	397	329	731	325	291	1260	561	295	1815	563
Arrive On Green	0.14	0.25	0.25	0.10	0.21	0.21	0.08	0.35	0.35	0.09	0.36	0.36
Sat Flow, veh/h	3456	3554	1585	3456	3554	1578	3456	3554	1584	3456	5106	1585
Grp Volume(v), veh/h	452	486	27	170	629	12	132	717	134	156	841	277
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1578	1728	1777	1584	1728	1702	1585
Q Serve(g_s), s	13.5	12.4	1.4	4.9	17.8	0.6	3.8	17.0	6.2	4.5	13.3	14.2
Cycle Q Clear(g_c), s	13.5	12.4	1.4	4.9	17.8	0.6	3.8	17.0	6.2	4.5	13.3	14.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	483	890	397	329	731	325	291	1260	561	295	1815	563
V/C Ratio(X)	0.94	0.55	0.07	0.52	0.86	0.04	0.45	0.57	0.24	0.53	0.46	0.49
Avail Cap(c_a), veh/h	483	1546	689	371	1430	635	298	1260	561	298	1815	563
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.4	34.0	29.8	44.9	40.0	33.2	45.5	27.2	23.8	45.7	26.0	26.3
Incr Delay (d2), s/veh	25.3	0.2	0.0	0.5	1.2	0.0	0.4	1.9	1.0	0.8	0.9	3.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.3	5.2	0.5	2.1	7.6	0.2	1.6	7.1	2.4	1.9	5.2	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	69.7	34.2	29.8	45.4	41.2	33.2	45.9	29.1	24.8	46.6	26.8	29.3
LnGrp LOS	E	C	C	D	D	C	D	C	C	D	C	C
Approach Vol, veh/h	965			811			983			1274		
Approach Delay, s/veh	50.7			42.0			30.8			29.8		
Approach LOS	D			D			C			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.6	42.9	20.0	26.9	14.7	42.8	15.3	31.6				
Change Period (Y+Rc), s	5.8	5.8	5.4	5.4	5.8	5.8	5.4	5.4				
Max Green Setting (Gmax), s	9.0	37.0	14.6	42.0	9.0	37.0	11.2	45.4				
Max Q Clear Time (g_c+I1), s	5.8	16.2	15.5	19.8	6.5	19.0	6.9	14.4				
Green Ext Time (p_c), s	0.0	0.9	0.0	0.7	0.0	0.7	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	37.5
HCM 6th LOS	D

Notes

User approved ignoring U-Turning movement.

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon PM Peak Hour (Site Folder: EAPPP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Bradshaw Road															
3	L2	All MCs	41	3.0	41	3.0	0.583	11.7	LOS B	4.7	121.2	0.73	0.72	1.10	30.3
8	T1	All MCs	651	3.0	651	3.0	0.583	11.6	LOS B	4.7	121.2	0.70	0.66	0.99	31.3
18	R2	All MCs	149	3.0	149	3.0	0.295	6.8	LOS A	1.3	32.2	0.57	0.45	0.57	32.8
Approach			841	3.0	841	3.0	0.583	10.7	LOS B	4.7	121.2	0.68	0.63	0.92	31.5
East: Sheldon Road															
1	L2	All MCs	67	3.0	67	3.0	0.996	79.1	LOS F	13.5	344.7	1.00	1.72	3.56	15.9
6	T1	All MCs	257	3.0	257	3.0	0.996	79.1	LOS F	13.5	344.7	1.00	1.72	3.56	16.1
16	R2	All MCs	30	3.0	30	3.0	0.996	83.5	LOS F	13.5	344.7	1.00	1.72	3.56	16.1
Approach			354	3.0	354	3.0	0.996	79.5	LOS F	13.5	344.7	1.00	1.72	3.56	16.1
North: Bradshaw Road															
7	L2	All MCs	39	3.0	39	3.0	0.628	9.7	LOS A	6.9	175.7	0.68	0.56	0.95	31.2
4	T1	All MCs	890	3.0	890	3.0	0.628	9.7	LOS A	6.9	175.7	0.67	0.55	0.92	31.9
14	R2	All MCs	410	3.0	410	3.0	0.318	5.3	LOS A	1.5	38.9	0.47	0.30	0.47	33.4
Approach			1339	3.0	1339	3.0	0.628	8.4	LOS A	6.9	175.7	0.61	0.48	0.78	32.3
West: Sheldon Road															
5	L2	All MCs	199	3.0	199	3.0	0.781	24.6	LOS C	6.6	168.4	0.88	1.14	1.84	25.4
2	T1	All MCs	297	3.0	297	3.0	0.781	24.6	LOS C	6.6	168.4	0.88	1.14	1.84	25.8
12	R2	All MCs	48	3.0	48	3.0	0.781	28.9	LOS D	6.6	168.4	0.88	1.14	1.84	25.7
Approach			544	3.0	544	3.0	0.781	25.0	LOS C	6.6	168.4	0.88	1.14	1.84	25.7
All Vehicles			3078	3.0	3078	3.0	0.996	20.1	LOS C	13.5	344.7	0.72	0.78	1.33	27.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\4_Existing Plus Approved Project Plus Project\Summer_Villas.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon AM Peak Hour (Site Folder: CNP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Waterman Road															
3	L2	All MCs	211	2.0	211	2.0	0.876	24.4	LOS C	19.5	496.0	1.00	1.37	2.38	25.6
8	T1	All MCs	589	2.0	589	2.0	0.876	24.4	LOS C	19.5	496.0	1.00	1.37	2.38	26.0
18	R2	All MCs	168	2.0	168	2.0	0.876	24.4	LOS C	19.5	496.0	1.00	1.37	2.38	25.8
Approach			968	2.0	968	2.0	0.876	24.4	LOS C	19.5	496.0	1.00	1.37	2.38	25.9
East: Sheldon Road															
1	L2	All MCs	189	2.0	189	2.0	1.566	281.1	LOS F	103.3	2625.0	1.00	4.95	13.91	6.6
6	T1	All MCs	600	2.0	600	2.0	1.566	281.1	LOS F	103.3	2625.0	1.00	4.95	13.91	6.6
16	R2	All MCs	63	2.0	63	2.0	1.566	281.1	LOS F	103.3	2625.0	1.00	4.95	13.91	6.6
Approach			853	2.0	853	2.0	1.566	281.1	LOS F	103.3	2625.0	1.00	4.95	13.91	6.6
North: Waterman Road															
7	L2	All MCs	42	2.0	42	2.0	0.962	48.8	LOS E	18.9	480.1	1.00	1.74	3.35	20.3
4	T1	All MCs	611	2.0	611	2.0	0.962	48.8	LOS E	18.9	480.1	1.00	1.74	3.35	20.5
14	R2	All MCs	211	2.0	211	2.0	0.310	9.2	LOS A	1.3	32.6	0.65	0.59	0.67	31.5
Approach			863	2.0	863	2.0	0.962	39.1	LOS E	18.9	480.1	0.92	1.46	2.70	22.4
West: Sheldon Road															
5	L2	All MCs	147	2.0	147	2.0	0.959	45.7	LOS E	19.2	487.1	1.00	1.72	3.26	20.6
2	T1	All MCs	347	2.0	347	2.0	0.959	45.7	LOS E	19.2	487.1	1.00	1.72	3.26	20.9
12	R2	All MCs	221	2.0	221	2.0	0.959	45.7	LOS E	19.2	487.1	1.00	1.72	3.26	20.8
Approach			716	2.0	716	2.0	0.959	45.7	LOS E	19.2	487.1	1.00	1.72	3.26	20.8
All Vehicles			3400	2.0	3400	2.0	1.566	97.0	LOS F	103.3	2625.0	0.98	2.37	5.54	14.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\5_Cumulative No Project

\Summer_Villas_CNP.sip9

HCM 6th Signalized Intersection Summary

2: Waterman Rd & Calvin Rd

Cumulative No Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	485	960	170	285	1430	230	150	600	270	90	490	430
Future Volume (veh/h)	485	960	170	285	1430	230	150	600	270	90	490	430
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	527	1043	92	310	1554	250	163	652	293	98	533	467
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	513	1629	724	356	1469	654	171	910	399	142	880	391
Arrive On Green	0.15	0.46	0.46	0.10	0.41	0.41	0.05	0.26	0.26	0.04	0.25	0.25
Sat Flow, veh/h	3456	3554	1581	3456	3554	1583	3456	3554	1556	3456	3554	1581
Grp Volume(v), veh/h	527	1043	92	310	1554	250	163	652	293	98	533	467
Grp Sat Flow(s),veh/h/ln	1728	1777	1581	1728	1777	1583	1728	1777	1556	1728	1777	1581
Q Serve(g_s), s	21.6	32.7	4.9	12.9	60.1	16.0	6.8	24.3	25.1	4.1	19.3	36.0
Cycle Q Clear(g_c), s	21.6	32.7	4.9	12.9	60.1	16.0	6.8	24.3	25.1	4.1	19.3	36.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	513	1629	724	356	1469	654	171	910	399	142	880	391
V/C Ratio(X)	1.03	0.64	0.13	0.87	1.06	0.38	0.95	0.72	0.74	0.69	0.61	1.19
Avail Cap(c_a), veh/h	513	1629	724	475	1469	654	171	910	399	152	880	391
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.9	30.2	22.7	64.3	42.6	29.7	68.9	49.3	49.6	68.8	48.4	54.7
Incr Delay (d2), s/veh	46.7	1.9	0.4	10.5	40.5	1.7	54.4	2.3	6.1	9.3	0.9	109.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.6	14.0	1.9	6.1	33.4	6.3	4.3	10.9	10.2	2.0	8.5	25.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	108.6	32.1	23.0	74.7	83.1	31.4	123.3	51.6	55.7	78.1	49.3	164.1
LnGrp LOS	F	C	C	E	F	C	F	D	E	E	D	F
Approach Vol, veh/h	1662			2114			1108			1098		
Approach Delay, s/veh	55.9			75.8			63.2			100.7		
Approach LOS	E			E			E			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	26.0	65.5	12.7	41.2	19.5	72.0	11.5	42.4				
Change Period (Y+Rc), s	4.4	* 5.4	5.5	5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	21.6	* 60	7.2	36.0	20.0	61.2	6.4	* 37				
Max Q Clear Time (g_c+I1), s	23.6	62.1	8.8	38.0	14.9	34.7	6.1	27.1				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.1	2.5	0.0	1.3				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			72.5									
HCM 6th LOS			E									
Notes												

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary 3: Waterman Rd & Bond Rd

Cumulative No Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	240	480	500	120	610	210	530	530	100	215	700	220
Future Volume (veh/h)	240	480	500	120	610	210	530	530	100	215	700	220
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	286	571	334	143	726	42	631	631	25	256	833	106
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	334	1063	473	283	1011	451	674	1268	559	305	888	396
Arrive On Green	0.10	0.30	0.30	0.08	0.28	0.28	0.20	0.36	0.36	0.09	0.25	0.25
Sat Flow, veh/h	3456	3554	1580	3456	3554	1585	3456	3554	1565	3456	3554	1585
Grp Volume(v), veh/h	286	571	334	143	726	42	631	631	25	256	833	106
Grp Sat Flow(s),veh/h/ln	1728	1777	1580	1728	1777	1585	1728	1777	1565	1728	1777	1585
Q Serve(g_s), s	10.9	17.9	25.1	5.3	24.5	2.6	24.0	18.5	1.4	9.7	30.7	7.2
Cycle Q Clear(g_c), s	10.9	17.9	25.1	5.3	24.5	2.6	24.0	18.5	1.4	9.7	30.7	7.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	334	1063	473	283	1011	451	674	1268	559	305	888	396
V/C Ratio(X)	0.86	0.54	0.71	0.50	0.72	0.09	0.94	0.50	0.04	0.84	0.94	0.27
Avail Cap(c_a), veh/h	399	1063	473	362	1011	451	756	1268	559	562	1038	463
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	59.4	39.1	41.6	58.7	42.9	35.1	52.9	33.6	28.1	59.9	49.1	40.3
Incr Delay (d2), s/veh	12.9	1.9	8.6	0.5	4.4	0.4	17.0	0.1	0.0	2.4	13.3	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	7.9	10.6	2.3	11.1	1.0	11.7	7.8	0.5	4.3	14.8	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	72.3	41.0	50.2	59.2	47.3	35.5	69.9	33.7	28.1	62.4	62.3	40.4
LnGrp LOS	E	D	D	E	D	D	E	C	C	E	E	D
Approach Vol, veh/h	1191			911			1287			1195		
Approach Delay, s/veh	51.1			48.6			51.3			60.4		
Approach LOS	D			D			D			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	18.7	43.8	31.9	39.2	16.7	45.8	17.6	53.4				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	15.4	38.0	29.2	39.0	14.0	39.4	21.7	46.5				
Max Q Clear Time (g_c+I1), s	12.9	26.5	26.0	32.7	7.3	27.1	11.7	20.5				
Green Ext Time (p_c), s	0.0	0.7	0.1	0.7	0.0	0.5	0.0	0.6				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	53.1											
HCM 6th LOS	D											

HCM 6th Signalized Intersection Summary 4: Elk Grove Florin Rd & Sheldon Rd

Cumulative No Project AM
Timing Plan: AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	542	340	140	210	630	170	100	1130	80	180	1040	600
Future Volume (veh/h)	542	340	140	210	630	170	100	1130	80	180	1040	600
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	589	370	36	228	685	61	109	1228	87	196	1130	478
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	620	1097	489	277	745	332	232	1862	578	236	1869	580
Arrive On Green	0.18	0.31	0.31	0.08	0.21	0.21	0.07	0.37	0.37	0.07	0.37	0.37
Sat Flow, veh/h	3428	3526	1572	3428	3526	1572	3428	5066	1572	3428	5066	1572
Grp Volume(v), veh/h	589	370	36	228	685	61	109	1228	87	196	1130	478
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1714	1763	1572	1714	1689	1572	1714	1689	1572
Q Serve(g_s), s	22.2	10.5	2.1	8.6	24.8	4.2	4.0	26.4	4.8	7.4	23.7	36.0
Cycle Q Clear(g_c), s	22.2	10.5	2.1	8.6	24.8	4.2	4.0	26.4	4.8	7.4	23.7	36.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	620	1097	489	277	745	332	232	1862	578	236	1869	580
V/C Ratio(X)	0.95	0.34	0.07	0.82	0.92	0.18	0.47	0.66	0.15	0.83	0.60	0.82
Avail Cap(c_a), veh/h	620	1344	600	415	1134	506	236	1862	578	236	1869	580
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.9	34.6	31.7	59.1	50.4	42.3	58.6	34.5	27.6	60.0	33.5	37.4
Incr Delay (d2), s/veh	24.3	0.1	0.0	4.8	6.4	0.1	0.6	1.9	0.6	20.2	1.5	12.5
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	11.5	4.5	0.8	3.9	11.4	1.6	1.7	10.8	1.9	3.8	9.6	15.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	77.2	34.7	31.7	63.9	56.8	42.4	59.2	36.3	28.2	80.2	34.9	49.9
LnGrp LOS	E	C	C	E	E	D	E	D	C	F	C	D
Approach Vol, veh/h	995			974			1424			1804		
Approach Delay, s/veh	59.8			57.6			37.6			43.8		
Approach LOS	E			E			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.6	54.0	29.0	33.0	14.8	53.8	16.0	46.0				
Change Period (Y+Rc), s	5.8	5.8	5.4	5.4	5.8	5.8	5.4	5.4				
Max Green Setting (Gmax), s	9.0	48.0	23.6	42.0	9.0	48.0	15.8	49.8				
Max Q Clear Time (g_c+I1), s	6.0	38.0	24.2	26.8	9.4	28.4	10.6	12.5				
Green Ext Time (p_c), s	0.0	1.2	0.0	0.8	0.0	1.5	0.0	0.4				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	47.7											
HCM 6th LOS	D											

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon AM Peak Hour (Site Folder: CNP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Bradshaw Road															
3	L2	All MCs	226	3.0	226	3.0	0.691	11.3	LOS B	9.3	238.4	0.78	0.74	1.26	30.1
8	T1	All MCs	1548	3.0	1548	3.0	0.691	11.3	LOS B	9.3	238.4	0.78	0.74	1.26	30.9
18	R2	All MCs	183	3.0	183	3.0	0.691	11.3	LOS B	9.3	238.4	0.78	0.74	1.26	30.9
Approach			1957	3.0	1957	3.0	0.691	11.3	LOS B	9.3	238.4	0.78	0.74	1.26	30.8
East: Sheldon Road															
1	L2	All MCs	215	3.0	215	3.0	1.847	425.5	LOS F	71.2	1823.0	1.00	4.26	14.25	4.7
6	T1	All MCs	226	3.0	226	3.0	1.847	425.5	LOS F	71.2	1823.0	1.00	4.26	14.25	4.7
16	R2	All MCs	32	3.0	32	3.0	1.847	431.0	LOS F	71.2	1823.0	1.00	4.26	14.25	4.7
Approach			473	3.0	473	3.0	1.847	425.8	LOS F	71.2	1823.0	1.00	4.26	14.25	4.7
North: Bradshaw Road															
7	L2	All MCs	48	3.0	48	3.0	0.660	10.6	LOS B	8.0	204.8	0.75	0.71	1.18	30.8
4	T1	All MCs	1333	3.0	1333	3.0	0.660	10.6	LOS B	8.0	204.8	0.75	0.71	1.18	31.4
14	R2	All MCs	462	3.0	462	3.0	0.660	10.6	LOS B	8.0	204.8	0.75	0.71	1.18	31.1
Approach			1844	3.0	1844	3.0	0.660	10.6	LOS B	8.0	204.8	0.75	0.71	1.18	31.3
West: Sheldon Road															
5	L2	All MCs	290	3.0	290	3.0	1.195	131.9	LOS F	35.7	913.2	1.00	3.18	8.91	11.6
2	T1	All MCs	183	3.0	183	3.0	1.195	131.9	LOS F	35.7	913.2	1.00	3.18	8.91	11.7
12	R2	All MCs	97	3.0	97	3.0	1.195	131.9	LOS F	35.7	913.2	1.00	3.18	8.91	11.7
Approach			570	3.0	570	3.0	1.195	131.9	LOS F	35.7	913.2	1.00	3.18	8.91	11.6
All Vehicles			4844	3.0	4844	3.0	1.847	65.7	LOS F	71.2	1823.0	0.82	1.36	3.40	17.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\5_Cumulative No Project

\Summer_Villas_CNP.sip9

MOVEMENT SUMMARY

 Site: 1 [Waterman & Sheldon PM Peak Hour (Site Folder: CNP)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Waterman Road															
3	L2	All MCs	204	1.0	204	1.0	1.067	69.6	LOS F	41.4	1042.7	1.00	2.47	5.08	17.0
8	T1	All MCs	516	1.0	516	1.0	1.067	69.6	LOS F	41.4	1042.7	1.00	2.47	5.08	17.1
18	R2	All MCs	183	1.0	183	1.0	1.067	69.6	LOS F	41.4	1042.7	1.00	2.47	5.08	17.1
Approach			903	1.0	903	1.0	1.067	69.6	LOS F	41.4	1042.7	1.00	2.47	5.08	17.1
East: Sheldon Road															
1	L2	All MCs	215	1.0	215	1.0	1.152	104.1	LOS F	47.2	1188.5	1.00	2.97	7.00	13.5
6	T1	All MCs	559	1.0	559	1.0	1.152	104.1	LOS F	47.2	1188.5	1.00	2.97	7.00	13.6
16	R2	All MCs	32	1.0	32	1.0	1.152	104.1	LOS F	47.2	1188.5	1.00	2.97	7.00	13.6
Approach			806	1.0	806	1.0	1.152	104.1	LOS F	47.2	1188.5	1.00	2.97	7.00	13.6
North: Waterman Road															
7	L2	All MCs	43	1.0	43	1.0	1.065	79.0	LOS F	27.5	693.0	1.00	2.25	5.05	16.0
4	T1	All MCs	602	1.0	602	1.0	1.065	79.0	LOS F	27.5	693.0	1.00	2.25	5.05	16.1
14	R2	All MCs	226	1.0	226	1.0	0.373	11.3	LOS B	1.7	42.4	0.70	0.71	0.84	30.6
Approach			871	1.0	871	1.0	1.065	61.4	LOS F	27.5	693.0	0.92	1.85	3.95	18.3
West: Sheldon Road															
5	L2	All MCs	129	1.0	129	1.0	0.761	17.4	LOS C	8.9	224.2	0.93	1.06	1.72	27.9
2	T1	All MCs	441	1.0	441	1.0	0.761	17.4	LOS C	8.9	224.2	0.93	1.06	1.72	28.4
12	R2	All MCs	204	1.0	204	1.0	0.761	17.4	LOS C	8.9	224.2	0.93	1.06	1.72	28.2
Approach			774	1.0	774	1.0	0.761	17.4	LOS C	8.9	224.2	0.93	1.06	1.72	28.2
All Vehicles			3355	1.0	3355	1.0	1.152	63.7	LOS F	47.2	1188.5	0.96	2.10	4.47	17.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\5_Cumulative No Project

\Summer_Villas_CNP.sip9

HCM 6th Signalized Intersection Summary

2: Waterman Rd & Calvin Rd

06/10/2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	405	1120	240	280	950	120	120	480	150	140	490	350
Future Volume (veh/h)	405	1120	240	280	950	120	120	480	150	140	490	350
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	471	1302	158	326	1105	140	140	558	174	163	570	407
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	524	1367	610	357	1198	533	170	951	424	222	1004	441
Arrive On Green	0.15	0.38	0.38	0.10	0.33	0.33	0.05	0.27	0.27	0.06	0.28	0.28
Sat Flow, veh/h	3483	3582	1598	3483	3582	1595	3483	3582	1596	3483	3582	1574
Grp Volume(v), veh/h	471	1302	158	326	1105	140	140	558	174	163	570	407
Grp Sat Flow(s),veh/h/ln	1742	1791	1598	1742	1791	1595	1742	1791	1596	1742	1791	1574
Q Serve(g_s), s	14.7	39.0	7.5	10.2	32.8	7.1	4.4	15.0	9.9	5.1	15.0	27.7
Cycle Q Clear(g_c), s	14.7	39.0	7.5	10.2	32.8	7.1	4.4	15.0	9.9	5.1	15.0	27.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	524	1367	610	357	1198	533	170	951	424	222	1004	441
V/C Ratio(X)	0.90	0.95	0.26	0.91	0.92	0.26	0.82	0.59	0.41	0.73	0.57	0.92
Avail Cap(c_a), veh/h	524	1367	610	357	1198	533	170	1094	487	246	1169	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.0	33.2	23.4	49.0	35.3	26.8	52.0	35.2	33.4	50.7	34.0	38.5
Incr Delay (d2), s/veh	17.9	15.4	1.0	26.7	13.0	1.2	24.9	0.3	0.2	7.9	0.2	19.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.4	18.7	2.9	5.6	15.6	2.8	2.5	6.3	3.7	2.4	6.3	12.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	63.9	48.6	24.5	75.7	48.4	28.0	76.9	35.5	33.6	58.7	34.2	57.8
LnGrp LOS	E	D	C	E	D	C	E	D	C	E	C	E
Approach Vol, veh/h	1931				1571				872			
Approach Delay, s/veh	50.3				52.2				41.8			
Approach LOS	D				D				D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.0	42.3	10.9	36.1	15.8	47.5	12.5	34.5				
Change Period (Y+Rc), s	4.4	* 5.4	5.5	5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	16.6	* 37	5.4	36.0	11.3	41.7	7.8	* 34				
Max Q Clear Time (g_c+I1), s	16.7	34.8	6.4	29.7	12.2	41.0	7.1	17.0				
Green Ext Time (p_c), s	0.0	0.8	0.0	1.0	0.0	0.4	0.0	1.2				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	48.6											
HCM 6th LOS	D											
Notes												

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary 3: Waterman Rd & Bond Rd

Cumulative No Project PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	180	600	440	130	550	120	305	640	140	160	610	250
Future Volume (veh/h)	180	600	440	130	550	120	305	640	140	160	610	250
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	182	606	265	131	556	42	308	646	31	162	616	52
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	362	1321	580	356	1315	585	369	733	326	361	725	323
Arrive On Green	0.10	0.37	0.37	0.10	0.37	0.37	0.11	0.20	0.20	0.10	0.20	0.20
Sat Flow, veh/h	3483	3582	1574	3483	3582	1595	3483	3582	1593	3483	3582	1598
Grp Volume(v), veh/h	182	606	265	131	556	42	308	646	31	162	616	52
Grp Sat Flow(s),veh/h/ln	1742	1791	1574	1742	1791	1595	1742	1791	1593	1742	1791	1598
Q Serve(g_s), s	5.2	13.5	13.4	3.7	12.2	1.8	9.1	18.4	1.7	4.6	17.4	2.8
Cycle Q Clear(g_c), s	5.2	13.5	13.4	3.7	12.2	1.8	9.1	18.4	1.7	4.6	17.4	2.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	362	1321	580	356	1315	585	369	733	326	361	725	323
V/C Ratio(X)	0.50	0.46	0.46	0.37	0.42	0.07	0.84	0.88	0.10	0.45	0.85	0.16
Avail Cap(c_a), veh/h	364	1321	580	364	1315	585	437	1403	624	364	1328	592
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.5	25.2	25.2	44.0	24.9	21.6	46.1	40.6	33.9	44.3	40.4	34.6
Incr Delay (d2), s/veh	0.4	1.1	2.6	0.2	1.0	0.2	10.0	1.4	0.0	0.3	1.1	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	5.6	5.2	1.6	5.1	0.7	4.3	7.9	0.6	1.9	7.4	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	44.9	26.4	27.8	44.3	25.9	21.9	56.1	42.0	34.0	44.6	41.5	34.7
LnGrp LOS	D	C	C	D	C	C	E	D	C	D	D	C
Approach Vol, veh/h		1053			729			985			830	
Approach Delay, s/veh		29.9			29.0			46.1			41.7	
Approach LOS		C			C			D			D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.7	44.4	16.9	27.1	16.6	44.6	16.7	27.3				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	11.0	38.6	13.2	39.0	11.0	38.6	11.0	41.2				
Max Q Clear Time (g_c+I1), s	7.2	14.2	11.1	19.4	5.7	15.5	6.6	20.4				
Green Ext Time (p_c), s	0.0	0.6	0.0	0.6	0.0	0.6	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			36.9									
HCM 6th LOS			D									

HCM 6th Signalized Intersection Summary 4: Elk Grove Florin Rd & Sheldon Rd

Cumulative No Project PM
Timing Plan: PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	555	510	120	160	580	90	132	1060	130	160	1120	570
Future Volume (veh/h)	555	510	120	160	580	90	132	1060	130	160	1120	570
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	597	548	32	172	624	14	142	1140	140	172	1204	462
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	608	1056	471	268	707	314	240	1946	604	241	1948	605
Arrive On Green	0.18	0.30	0.30	0.08	0.20	0.20	0.07	0.38	0.38	0.07	0.38	0.38
Sat Flow, veh/h	3456	3554	1585	3456	3554	1578	3456	5106	1584	3456	5106	1585
Grp Volume(v), veh/h	597	548	32	172	624	14	142	1140	140	172	1204	462
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1578	1728	1702	1584	1728	1702	1585
Q Serve(g_s), s	22.1	16.5	1.9	6.2	21.9	0.9	5.1	22.9	7.7	6.3	24.5	32.7
Cycle Q Clear(g_c), s	22.1	16.5	1.9	6.2	21.9	0.9	5.1	22.9	7.7	6.3	24.5	32.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	608	1056	471	268	707	314	240	1946	604	241	1948	605
V/C Ratio(X)	0.98	0.52	0.07	0.64	0.88	0.04	0.59	0.59	0.23	0.71	0.62	0.76
Avail Cap(c_a), veh/h	608	1438	641	339	1161	516	242	1946	604	242	1948	605
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	52.8	37.5	32.4	57.5	50.0	41.6	58.0	31.7	27.0	58.5	32.2	34.7
Incr Delay (d2), s/veh	31.9	0.1	0.0	1.1	2.7	0.0	2.6	1.3	0.9	8.1	1.5	8.9
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.1	7.1	0.7	2.7	9.8	0.4	2.3	9.3	3.0	3.0	10.0	13.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	84.7	37.7	32.4	58.7	52.8	41.6	60.6	33.0	27.9	66.6	33.7	43.6
LnGrp LOS	F	D	C	E	D	D	E	C	C	E	C	D
Approach Vol, veh/h	1177			810			1422			1838		
Approach Delay, s/veh	61.4			53.8			35.2			39.2		
Approach LOS	E			D			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.7	54.8	28.0	31.0	14.8	54.8	15.4	43.6				
Change Period (Y+Rc), s	5.8	5.8	5.4	5.4	5.8	5.8	5.4	5.4				
Max Green Setting (Gmax), s	9.0	49.0	22.6	42.0	9.0	49.0	12.6	52.0				
Max Q Clear Time (g_c+l1), s	7.1	34.7	24.1	23.9	8.3	24.9	8.2	18.5				
Green Ext Time (p_c), s	0.0	1.3	0.0	0.7	0.0	1.3	0.0	0.6				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	45.4											
HCM 6th LOS	D											

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon PM Peak Hour (Site Folder: CNP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Bradshaw Road															
3	L2	All MCs	69	3.0	69	3.0	0.650	12.4	LOS B	7.2	185.1	0.76	0.72	1.19	30.0
8	T1	All MCs	1172	3.0	1172	3.0	0.650	12.4	LOS B	7.2	185.1	0.76	0.72	1.19	30.6
18	R2	All MCs	161	3.0	161	3.0	0.650	12.4	LOS B	7.2	185.1	0.76	0.72	1.19	30.4
Approach			1402	3.0	1402	3.0	0.650	12.4	LOS B	7.2	185.1	0.76	0.72	1.19	30.6
East: Sheldon Road															
1	L2	All MCs	69	3.0	69	3.0	2.212	596.2	LOS F	78.4	2006.2	1.00	3.81	12.38	3.5
6	T1	All MCs	322	3.0	322	3.0	2.212	595.6	LOS F	78.4	2006.2	1.00	3.81	12.38	3.5
16	R2	All MCs	46	3.0	46	3.0	2.212	596.2	LOS F	78.4	2006.2	1.00	3.81	12.38	3.5
Approach			437	3.0	437	3.0	2.212	595.8	LOS F	78.4	2006.2	1.00	3.81	12.38	3.5
North: Bradshaw Road															
7	L2	All MCs	52	3.0	52	3.0	0.628	9.1	LOS A	5.3	135.5	0.61	0.35	0.63	31.4
4	T1	All MCs	1391	3.0	1391	3.0	0.628	9.1	LOS A	5.3	135.5	0.61	0.35	0.63	32.1
14	R2	All MCs	517	3.0	517	3.0	0.628	9.1	LOS A	5.3	135.5	0.61	0.35	0.63	31.7
Approach			1960	3.0	1960	3.0	0.628	9.1	LOS A	5.3	135.5	0.61	0.35	0.63	32.0
West: Sheldon Road															
5	L2	All MCs	218	3.0	218	3.0	1.472	245.0	LOS F	73.0	1869.0	1.00	4.81	14.86	7.4
2	T1	All MCs	310	3.0	310	3.0	1.472	245.0	LOS F	73.0	1869.0	1.00	4.81	14.86	7.4
12	R2	All MCs	149	3.0	149	3.0	1.472	245.0	LOS F	73.0	1869.0	1.00	4.81	14.86	7.4
Approach			678	3.0	678	3.0	1.472	245.0	LOS F	73.0	1869.0	1.00	4.81	14.86	7.4
All Vehicles			4477	3.0	4477	3.0	2.212	103.1	LOS F	78.4	2006.2	0.75	1.48	4.11	13.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\5_Cumulative No Project

\Summer_Villas_CNP.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon AM Peak Hour (Site Folder: CPP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Waterman Road															
3	L2	All MCs	221	2.0	221	2.0	0.914	29.2	LOS D	23.4	594.9	1.00	1.56	2.73	24.3
8	T1	All MCs	600	2.0	600	2.0	0.914	29.2	LOS D	23.4	594.9	1.00	1.56	2.73	24.7
18	R2	All MCs	177	2.0	177	2.0	0.914	29.2	LOS D	23.4	594.9	1.00	1.56	2.73	24.5
Approach			998	2.0	998	2.0	0.914	29.2	LOS D	23.4	594.9	1.00	1.56	2.73	24.5
East: Sheldon Road															
1	L2	All MCs	211	2.0	211	2.0	1.815	390.4	LOS F	141.7	3600.1	1.00	5.80	16.80	5.0
6	T1	All MCs	662	2.0	662	2.0	1.815	390.4	LOS F	141.7	3600.1	1.00	5.80	16.80	5.0
16	R2	All MCs	94	2.0	94	2.0	1.815	390.4	LOS F	141.7	3600.1	1.00	5.80	16.80	5.0
Approach			966	2.0	966	2.0	1.815	390.4	LOS F	141.7	3600.1	1.00	5.80	16.80	5.0
North: Waterman Road															
7	L2	All MCs	47	2.0	47	2.0	0.961	48.2	LOS E	19.2	487.2	1.00	1.74	3.35	20.3
4	T1	All MCs	613	2.0	613	2.0	0.961	48.2	LOS E	19.2	487.2	1.00	1.74	3.35	20.6
14	R2	All MCs	211	2.0	211	2.0	0.306	9.0	LOS A	1.3	32.0	0.65	0.58	0.66	31.5
Approach			871	2.0	871	2.0	0.961	38.7	LOS E	19.2	487.2	0.91	1.46	2.70	22.4
West: Sheldon Road															
5	L2	All MCs	147	2.0	147	2.0	0.980	50.2	LOS F	21.4	543.1	1.00	1.84	3.56	19.8
2	T1	All MCs	357	2.0	357	2.0	0.980	50.2	LOS F	21.4	543.1	1.00	1.84	3.56	20.1
12	R2	All MCs	223	2.0	223	2.0	0.980	50.2	LOS F	21.4	543.1	1.00	1.84	3.56	20.0
Approach			727	2.0	727	2.0	0.980	50.2	LOS F	21.4	543.1	1.00	1.84	3.56	20.0
All Vehicles			3562	2.0	3562	2.0	1.815	133.8	LOS F	141.7	3600.1	0.98	2.74	6.71	11.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\6_Cumulative Plus Project

Summer_Villas_.sip9

HCM 6th Signalized Intersection Summary 2: Waterman Rd & Calvin Rd

Cumulative Plus Project AM
04/04/2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	485	960	172	285	1430	230	160	629	272	90	495	430
Future Volume (veh/h)	485	960	172	285	1430	230	160	629	272	90	495	430
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	527	1043	113	310	1554	250	174	684	296	98	538	467
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	499	1619	720	356	1474	656	181	920	403	142	880	391
Arrive On Green	0.14	0.46	0.46	0.10	0.41	0.41	0.05	0.26	0.26	0.04	0.25	0.25
Sat Flow, veh/h	3456	3554	1581	3456	3554	1583	3456	3554	1556	3456	3554	1581
Grp Volume(v), veh/h	527	1043	113	310	1554	250	174	684	296	98	538	467
Grp Sat Flow(s),veh/h/ln	1728	1777	1581	1728	1777	1583	1728	1777	1556	1728	1777	1581
Q Serve(g_s), s	21.0	32.9	6.1	12.9	60.3	16.0	7.3	25.7	25.3	4.1	19.5	36.0
Cycle Q Clear(g_c), s	21.0	32.9	6.1	12.9	60.3	16.0	7.3	25.7	25.3	4.1	19.5	36.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	499	1619	720	356	1474	656	181	920	403	142	880	391
V/C Ratio(X)	1.06	0.64	0.16	0.87	1.05	0.38	0.96	0.74	0.73	0.69	0.61	1.19
Avail Cap(c_a), veh/h	499	1619	720	475	1474	656	181	920	403	152	880	391
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	62.2	30.5	23.2	64.3	42.5	29.6	68.8	49.4	49.3	68.8	48.5	54.7
Incr Delay (d2), s/veh	55.8	2.0	0.5	10.5	39.3	1.7	55.7	2.9	6.0	9.3	0.9	109.4
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.9	14.0	2.3	6.1	33.3	6.3	4.6	11.5	10.3	2.0	8.6	25.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	118.0	32.5	23.7	74.7	81.8	31.3	124.5	52.4	55.3	78.1	49.4	164.1
LnGrp LOS	F	C	C	E	F	C	F	D	E	E	D	F
Approach Vol, veh/h	1683			2114			1154			1103		
Approach Delay, s/veh	58.7			74.8			64.0			100.5		
Approach LOS	E			E			E			F		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	25.4	65.7	13.1	41.2	19.5	71.6	11.5	42.8				
Change Period (Y+Rc), s	4.4	* 5.4	5.5	5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	21.0	* 60	7.6	36.0	20.0	60.8	6.4	* 37				
Max Q Clear Time (g_c+I1), s	23.0	62.3	9.3	38.0	14.9	34.9	6.1	27.7				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.1	2.5	0.0	1.4				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	72.9											
HCM 6th LOS	E											
Notes												

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

HCM 6th Signalized Intersection Summary 3: Waterman Rd & Bond Rd

Cumulative Plus Project AM
04/04/2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	245	480	500	120	610	210	530	535	100	225	720	251
Future Volume (veh/h)	245	480	500	120	610	210	530	535	100	225	720	251
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	292	571	335	143	726	40	631	637	25	268	857	128
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	339	1057	470	279	995	444	674	1278	563	316	909	406
Arrive On Green	0.10	0.30	0.30	0.08	0.28	0.28	0.19	0.36	0.36	0.09	0.26	0.26
Sat Flow, veh/h	3456	3554	1580	3456	3554	1585	3456	3554	1565	3456	3554	1585
Grp Volume(v), veh/h	292	571	335	143	726	40	631	637	25	268	857	128
Grp Sat Flow(s),veh/h/ln	1728	1777	1580	1728	1777	1585	1728	1777	1565	1728	1777	1585
Q Serve(g_s), s	11.3	18.2	25.6	5.4	25.1	2.5	24.4	19.0	1.4	10.4	32.1	8.9
Cycle Q Clear(g_c), s	11.3	18.2	25.6	5.4	25.1	2.5	24.4	19.0	1.4	10.4	32.1	8.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	339	1057	470	279	995	444	674	1278	563	316	909	406
V/C Ratio(X)	0.86	0.54	0.71	0.51	0.73	0.09	0.94	0.50	0.04	0.85	0.94	0.32
Avail Cap(c_a), veh/h	392	1057	470	357	995	444	744	1278	563	553	1021	456
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	60.3	39.9	42.5	59.8	44.2	36.1	53.8	33.9	28.3	60.7	49.5	40.9
Incr Delay (d2), s/veh	14.2	2.0	8.9	0.5	4.7	0.4	17.6	0.1	0.0	2.5	14.6	0.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.5	8.1	10.9	2.3	11.4	1.0	12.0	8.0	0.5	4.6	15.7	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	74.5	41.9	51.4	60.4	48.9	36.5	71.4	34.0	28.3	63.2	64.1	41.0
LnGrp LOS	E	D	D	E	D	D	E	C	C	E	E	D
Approach Vol, veh/h		1198			909			1293			1253	
Approach Delay, s/veh		52.5			50.1			52.1			61.5	
Approach LOS		D			D			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	19.1	43.8	32.3	40.5	16.7	46.2	18.2	54.6				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	15.4	38.0	29.2	39.0	14.0	39.4	21.7	46.5				
Max Q Clear Time (g_c+I1), s	13.3	27.1	26.4	34.1	7.4	27.6	12.4	21.0				
Green Ext Time (p_c), s	0.0	0.7	0.1	0.6	0.0	0.5	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			54.4									
HCM 6th LOS			D									

HCM 6th Signalized Intersection Summary 4: Elk Grove Florin Rd & Sheldon Rd

Cumulative Plus Project AM
04/04/2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	542	349	140	216	691	172	100	1130	81	180	1040	600
Future Volume (veh/h)	542	349	140	216	691	172	100	1130	81	180	1040	600
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	589	379	37	235	751	65	109	1228	88	196	1130	543
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	606	1140	508	281	807	360	218	1877	583	236	1903	591
Arrive On Green	0.18	0.32	0.32	0.08	0.23	0.23	0.06	0.37	0.37	0.07	0.38	0.38
Sat Flow, veh/h	3428	3526	1572	3428	3526	1572	3428	5066	1572	3428	5066	1572
Grp Volume(v), veh/h	589	379	37	235	751	65	109	1228	88	196	1130	543
Grp Sat Flow(s),veh/h/ln	1714	1763	1572	1714	1763	1572	1714	1689	1572	1714	1689	1572
Q Serve(g_s), s	23.8	11.4	2.3	9.4	29.1	4.6	4.3	28.1	5.2	7.9	25.0	45.9
Cycle Q Clear(g_c), s	23.8	11.4	2.3	9.4	29.1	4.6	4.3	28.1	5.2	7.9	25.0	45.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	606	1140	508	281	807	360	218	1877	583	236	1903	591
V/C Ratio(X)	0.97	0.33	0.07	0.83	0.93	0.18	0.50	0.65	0.15	0.83	0.59	0.92
Avail Cap(c_a), veh/h	606	1140	508	606	1063	474	236	1877	583	236	1903	591
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	57.0	35.7	32.6	63.0	52.6	43.2	63.1	36.4	29.2	64.0	34.9	41.4
Incr Delay (d2), s/veh	29.5	0.1	0.0	2.5	10.4	0.1	0.7	1.8	0.5	20.1	1.4	21.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.6	4.9	0.9	4.2	13.8	1.8	1.9	11.5	2.0	4.0	10.2	20.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	86.5	35.8	32.7	65.5	63.0	43.3	63.7	38.2	29.8	84.2	36.3	63.1
LnGrp LOS	F	D	C	E	E	D	E	D	C	F	D	E
Approach Vol, veh/h	1005			1051			1425			1869		
Approach Delay, s/veh	65.4			62.3			39.6			49.1		
Approach LOS	E			E			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.3	57.7	30.0	37.3	15.0	57.0	16.8	50.4				
Change Period (Y+Rc), s	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4				
Max Green Setting (Gmax), s	9.6	51.6	24.6	42.0	9.6	51.6	24.6	42.0				
Max Q Clear Time (g_c+I1), s	6.3	47.9	25.8	31.1	9.9	30.1	11.4	13.4				
Green Ext Time (p_c), s	0.0	0.8	0.0	0.8	0.0	1.5	0.0	0.4				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	52.2											
HCM 6th LOS	D											

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon AM Peak Hour (Site Folder: CPP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Bradshaw Road															
3	L2	All MCs	226	3.0	226	3.0	0.693	11.4	LOS B	9.4	239.4	0.78	0.75	1.26	30.0
8	T1	All MCs	1548	3.0	1548	3.0	0.693	11.4	LOS B	9.4	239.4	0.78	0.75	1.26	30.9
18	R2	All MCs	183	3.0	183	3.0	0.693	11.4	LOS B	9.4	239.4	0.78	0.75	1.26	30.8
Approach			1957	3.0	1957	3.0	0.693	11.4	LOS B	9.4	239.4	0.78	0.75	1.26	30.8
East: Sheldon Road															
1	L2	All MCs	215	3.0	215	3.0	1.856	429.5	LOS F	71.7	1836.6	1.00	4.27	14.30	4.7
6	T1	All MCs	227	3.0	227	3.0	1.856	429.5	LOS F	71.7	1836.6	1.00	4.27	14.30	4.7
16	R2	All MCs	32	3.0	32	3.0	1.856	435.0	LOS F	71.7	1836.6	1.00	4.27	14.30	4.7
Approach			474	3.0	474	3.0	1.856	429.8	LOS F	71.7	1836.6	1.00	4.27	14.30	4.7
North: Bradshaw Road															
7	L2	All MCs	48	3.0	48	3.0	0.660	10.6	LOS B	8.0	205.5	0.75	0.71	1.19	30.8
4	T1	All MCs	1333	3.0	1333	3.0	0.660	10.6	LOS B	8.0	205.5	0.75	0.71	1.19	31.4
14	R2	All MCs	466	3.0	466	3.0	0.660	10.6	LOS B	8.0	205.5	0.75	0.71	1.19	31.1
Approach			1847	3.0	1847	3.0	0.660	10.6	LOS B	8.0	205.5	0.75	0.71	1.19	31.3
West: Sheldon Road															
5	L2	All MCs	310	3.0	310	3.0	1.257	155.7	LOS F	44.4	1136.2	1.00	3.61	10.49	10.4
2	T1	All MCs	191	3.0	191	3.0	1.257	155.7	LOS F	44.4	1136.2	1.00	3.61	10.49	10.4
12	R2	All MCs	99	3.0	99	3.0	1.257	155.7	LOS F	44.4	1136.2	1.00	3.61	10.49	10.4
Approach			600	3.0	600	3.0	1.257	155.7	LOS F	44.4	1136.2	1.00	3.61	10.49	10.4
All Vehicles			4878	3.0	4878	3.0	1.856	69.5	LOS F	71.7	1836.6	0.82	1.43	3.64	17.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\6_Cumulative Plus Project

\Summer_Villas_.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon PM Peak Hour (Site Folder: CPP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Waterman Road															
3	L2	All MCs	210	1.0	210	1.0	1.183	112.6	LOS F	60.2	1518.2	1.00	3.29	7.63	12.9
8	T1	All MCs	519	1.0	519	1.0	1.183	112.6	LOS F	60.2	1518.2	1.00	3.29	7.63	13.0
18	R2	All MCs	198	1.0	198	1.0	1.183	112.6	LOS F	60.2	1518.2	1.00	3.29	7.63	12.9
Approach			927	1.0	927	1.0	1.183	112.6	LOS F	60.2	1518.2	1.00	3.29	7.63	12.9
East: Sheldon Road															
1	L2	All MCs	223	1.0	223	1.0	1.141	98.4	LOS F	48.3	1216.6	1.00	2.94	6.76	14.0
6	T1	All MCs	581	1.0	581	1.0	1.141	98.4	LOS F	48.3	1216.6	1.00	2.94	6.76	14.1
16	R2	All MCs	43	1.0	43	1.0	1.141	98.4	LOS F	48.3	1216.6	1.00	2.94	6.76	14.1
Approach			846	1.0	846	1.0	1.141	98.4	LOS F	48.3	1216.6	1.00	2.94	6.76	14.1
North: Waterman Road															
7	L2	All MCs	71	1.0	71	1.0	1.141	104.4	LOS F	38.3	965.1	1.00	2.74	6.65	13.6
4	T1	All MCs	612	1.0	612	1.0	1.141	104.4	LOS F	38.3	965.1	1.00	2.74	6.65	13.7
14	R2	All MCs	226	1.0	226	1.0	0.377	11.5	LOS B	1.7	43.1	0.71	0.72	0.85	30.5
Approach			909	1.0	909	1.0	1.141	81.3	LOS F	38.3	965.1	0.93	2.24	5.21	15.8
West: Sheldon Road															
5	L2	All MCs	129	1.0	129	1.0	0.830	21.9	LOS C	11.9	300.3	0.99	1.23	2.10	26.4
2	T1	All MCs	498	1.0	498	1.0	0.830	21.9	LOS C	11.9	300.3	0.99	1.23	2.10	26.9
12	R2	All MCs	214	1.0	214	1.0	0.830	21.9	LOS C	11.9	300.3	0.99	1.23	2.10	26.7
Approach			841	1.0	841	1.0	0.830	21.9	LOS C	11.9	300.3	0.99	1.23	2.10	26.8
All Vehicles			3523	1.0	3523	1.0	1.183	79.5	LOS F	60.2	1518.2	0.98	2.44	5.48	15.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\6_Cumulative Plus Project

\Summer_Villas_.sip9

HCM 6th Signalized Intersection Summary 2: Waterman Rd & Calvin Rd

Cumulative Plus Project PM
04/04/2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	405	1120	249	282	950	120	123	490	151	140	516	350
Future Volume (veh/h)	405	1120	249	282	950	120	123	490	151	140	516	350
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	471	1302	198	328	1105	140	143	570	176	163	600	407
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	524	1363	608	357	1194	532	174	956	426	222	1006	442
Arrive On Green	0.15	0.38	0.38	0.10	0.33	0.33	0.05	0.27	0.27	0.06	0.28	0.28
Sat Flow, veh/h	3483	3582	1598	3483	3582	1595	3483	3582	1596	3483	3582	1574
Grp Volume(v), veh/h	471	1302	198	328	1105	140	143	570	176	163	600	407
Grp Sat Flow(s),veh/h/ln	1742	1791	1598	1742	1791	1595	1742	1791	1596	1742	1791	1574
Q Serve(g_s), s	14.7	39.1	9.7	10.3	32.8	7.1	4.5	15.3	10.0	5.1	16.0	27.7
Cycle Q Clear(g_c), s	14.7	39.1	9.7	10.3	32.8	7.1	4.5	15.3	10.0	5.1	16.0	27.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	524	1363	608	357	1194	532	174	956	426	222	1006	442
V/C Ratio(X)	0.90	0.96	0.33	0.92	0.93	0.26	0.82	0.60	0.41	0.73	0.60	0.92
Avail Cap(c_a), veh/h	524	1363	608	357	1194	532	174	1097	489	246	1168	513
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	46.1	33.3	24.2	49.1	35.5	26.9	52.0	35.3	33.3	50.8	34.3	38.5
Incr Delay (d2), s/veh	17.9	15.8	1.4	27.9	13.4	1.2	25.0	0.3	0.2	8.0	0.3	19.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.4	18.8	3.7	5.7	15.7	2.8	2.5	6.5	3.8	2.4	6.7	12.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	64.0	49.1	25.6	77.0	48.9	28.1	76.9	35.6	33.6	58.7	34.6	57.7
LnGrp LOS	E	D	C	E	D	C	E	D	C	E	C	E
Approach Vol, veh/h	1971				1573				889			
Approach Delay, s/veh	50.3				52.9				41.9			
Approach LOS	D				D				D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	21.0	42.2	11.0	36.2	15.8	47.4	12.5	34.7				
Change Period (Y+Rc), s	4.4	* 5.4	5.5	5.2	4.5	5.4	5.5	* 5.2				
Max Green Setting (Gmax), s	16.6	* 37	5.5	36.0	11.3	41.6	7.8	* 34				
Max Q Clear Time (g_c+I1), s	16.7	34.8	6.5	29.7	12.3	41.1	7.1	17.3				
Green Ext Time (p_c), s	0.0	0.8	0.0	1.1	0.0	0.3	0.0	1.2				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			48.8									
HCM 6th LOS			D									
Notes												

HCM 6th Signalized Intersection Summary 3: Waterman Rd & Bond Rd

Cumulative Plus Project PM
04/04/2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	208	600	440	130	550	120	305	666	140	163	617	261
Future Volume (veh/h)	208	600	440	130	550	120	305	666	140	163	617	261
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	210	606	266	131	556	42	308	673	31	165	623	56
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	360	1309	575	353	1302	580	368	759	337	358	748	334
Arrive On Green	0.10	0.37	0.37	0.10	0.36	0.36	0.11	0.21	0.21	0.10	0.21	0.21
Sat Flow, veh/h	3483	3582	1574	3483	3582	1595	3483	3582	1593	3483	3582	1598
Grp Volume(v), veh/h	210	606	266	131	556	42	308	673	31	165	623	56
Grp Sat Flow(s),veh/h/ln	1742	1791	1574	1742	1791	1595	1742	1791	1593	1742	1791	1598
Q Serve(g_s), s	6.1	13.7	13.7	3.7	12.4	1.8	9.2	19.4	1.7	4.7	17.7	3.1
Cycle Q Clear(g_c), s	6.1	13.7	13.7	3.7	12.4	1.8	9.2	19.4	1.7	4.7	17.7	3.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	360	1309	575	353	1302	580	368	759	337	358	748	334
V/C Ratio(X)	0.58	0.46	0.46	0.37	0.43	0.07	0.84	0.89	0.09	0.46	0.83	0.17
Avail Cap(c_a), veh/h	361	1309	575	361	1302	580	433	1390	618	361	1316	587
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.4	25.7	25.7	44.5	25.5	22.1	46.6	40.6	33.6	44.9	40.2	34.4
Incr Delay (d2), s/veh	1.6	1.2	2.7	0.2	1.0	0.2	10.3	1.4	0.0	0.3	0.9	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.6	5.7	5.3	1.6	5.2	0.7	4.4	8.3	0.6	2.0	7.6	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	47.0	26.9	28.4	44.8	26.5	22.3	56.9	42.1	33.7	45.2	41.2	34.5
LnGrp LOS	D	C	C	D	C	C	E	D	C	D	D	C
Approach Vol, veh/h	1082				729				1012			
Approach Delay, s/veh	31.2				29.5				46.3			
Approach LOS	C				C				D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	16.8	44.4	17.0	28.0	16.6	44.6	16.7	28.3				
Change Period (Y+Rc), s	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8				
Max Green Setting (Gmax), s	11.0	38.6	13.2	39.0	11.0	38.6	11.0	41.2				
Max Q Clear Time (g_c+I1), s	8.1	14.4	11.2	19.7	5.7	15.7	6.7	21.4				
Green Ext Time (p_c), s	0.0	0.6	0.0	0.6	0.0	0.6	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	37.4											
HCM 6th LOS	D											

HCM 6th Signalized Intersection Summary 4: Elk Grove Florin Rd & Sheldon Rd

Cumulative Plus Project PM
04/04/2025

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	555	564	120	162	601	91	132	1060	135	162	1120	570
Future Volume (veh/h)	555	564	120	162	601	91	132	1060	135	162	1120	570
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	597	606	32	174	646	15	142	1140	145	174	1204	509
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	603	1073	479	266	727	323	239	1932	599	240	1934	600
Arrive On Green	0.17	0.30	0.30	0.08	0.20	0.20	0.07	0.38	0.38	0.07	0.38	0.38
Sat Flow, veh/h	3456	3554	1585	3456	3554	1578	3456	5106	1584	3456	5106	1585
Grp Volume(v), veh/h	597	606	32	174	646	15	142	1140	145	174	1204	509
Grp Sat Flow(s),veh/h/ln	1728	1777	1585	1728	1777	1578	1728	1702	1584	1728	1702	1585
Q Serve(g_s), s	22.3	18.6	1.9	6.3	22.9	1.0	5.2	23.1	8.1	6.4	24.8	38.0
Cycle Q Clear(g_c), s	22.3	18.6	1.9	6.3	22.9	1.0	5.2	23.1	8.1	6.4	24.8	38.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	603	1073	479	266	727	323	239	1932	599	240	1934	600
V/C Ratio(X)	0.99	0.56	0.07	0.65	0.89	0.05	0.59	0.59	0.24	0.73	0.62	0.85
Avail Cap(c_a), veh/h	603	1425	635	339	1153	512	240	1932	599	240	1934	600
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	53.3	38.0	32.2	58.1	50.1	41.4	58.5	32.2	27.5	59.0	32.7	36.8
Incr Delay (d2), s/veh	33.9	0.2	0.0	1.3	3.5	0.0	2.7	1.3	1.0	9.1	1.5	13.9
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.3	8.0	0.7	2.8	10.3	0.4	2.3	9.4	3.2	3.0	10.1	16.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	87.2	38.2	32.2	59.4	53.6	41.4	61.2	33.5	28.5	68.2	34.2	50.7
LnGrp LOS	F	D	C	E	D	D	E	C	C	E	C	D
Approach Vol, veh/h	1235			835			1427			1887		
Approach Delay, s/veh	61.7			54.6			35.8			41.8		
Approach LOS	E			D			D			D		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.7	54.8	28.0	31.9	14.8	54.8	15.4	44.5				
Change Period (Y+Rc), s	5.8	5.8	5.4	5.4	5.8	5.8	5.4	5.4				
Max Green Setting (Gmax), s	9.0	49.0	22.6	42.0	9.0	49.0	12.7	51.9				
Max Q Clear Time (g_c+I1), s	7.2	40.0	24.3	24.9	8.4	25.1	8.3	20.6				
Green Ext Time (p_c), s	0.0	1.2	0.0	0.7	0.0	1.3	0.0	0.7				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	46.7											
HCM 6th LOS	D											

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon PM Peak Hour (Site Folder: CPP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Bradshaw Road															
3	L2	All MCs	71	3.0	71	3.0	0.652	12.4	LOS B	7.3	186.4	0.76	0.73	1.19	29.9
8	T1	All MCs	1172	3.0	1172	3.0	0.652	12.4	LOS B	7.3	186.4	0.76	0.73	1.19	30.6
18	R2	All MCs	161	3.0	161	3.0	0.652	12.4	LOS B	7.3	186.4	0.76	0.73	1.19	30.4
Approach			1405	3.0	1405	3.0	0.652	12.4	LOS B	7.3	186.4	0.76	0.73	1.19	30.5
East: Sheldon Road															
1	L2	All MCs	69	3.0	69	3.0	2.264	619.4	LOS F	81.1	2077.4	1.00	3.85	12.54	3.4
6	T1	All MCs	330	3.0	330	3.0	2.264	618.8	LOS F	81.1	2077.4	1.00	3.85	12.54	3.4
16	R2	All MCs	46	3.0	46	3.0	2.264	619.4	LOS F	81.1	2077.4	1.00	3.85	12.54	3.4
Approach			445	3.0	445	3.0	2.264	618.9	LOS F	81.1	2077.4	1.00	3.85	12.54	3.4
North: Bradshaw Road															
7	L2	All MCs	52	3.0	52	3.0	0.635	9.2	LOS A	5.7	145.9	0.61	0.37	0.66	31.4
4	T1	All MCs	1391	3.0	1391	3.0	0.635	9.2	LOS A	5.7	145.9	0.61	0.37	0.66	32.0
14	R2	All MCs	536	3.0	536	3.0	0.635	9.2	LOS A	5.7	145.9	0.61	0.37	0.66	31.7
Approach			1978	3.0	1978	3.0	0.635	9.2	LOS A	5.7	145.9	0.61	0.37	0.66	31.9
West: Sheldon Road															
5	L2	All MCs	225	3.0	225	3.0	1.496	255.2	LOS F	76.4	1956.4	1.00	4.93	15.29	7.2
2	T1	All MCs	314	3.0	314	3.0	1.496	255.2	LOS F	76.4	1956.4	1.00	4.93	15.29	7.2
12	R2	All MCs	151	3.0	151	3.0	1.496	255.2	LOS F	76.4	1956.4	1.00	4.93	15.29	7.2
Approach			690	3.0	690	3.0	1.496	255.2	LOS F	76.4	1956.4	1.00	4.93	15.29	7.2
All Vehicles			4517	3.0	4517	3.0	2.264	107.8	LOS F	81.1	2077.4	0.76	1.52	4.23	13.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\6_Cumulative Plus Project

Summer_Villas_.sip9

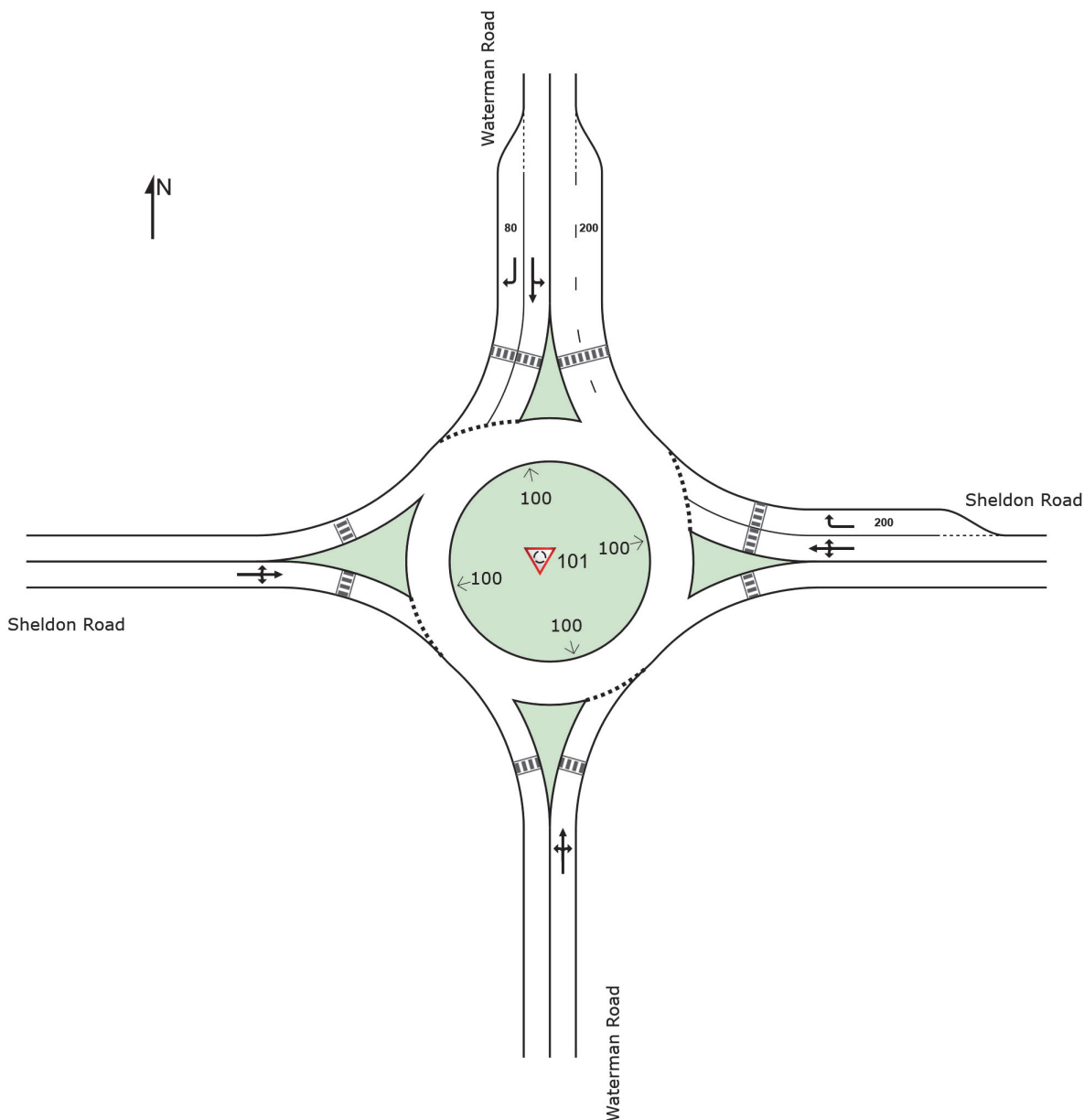
Appendix C

Delay Reports – with Improvements

Fehr&Peers

 Site: 1 [Waterman & Sheldon - improvement (Site Folder: Existing Plus Project)]

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon AM Peak Hour - improvement
(Site Folder: Existing Plus Project)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Waterman Road															
3	L2	All MCs	220	2.0	220	2.0	0.667	12.3	LOS B	7.9	199.5	0.83	0.80	1.30	29.5
8	T1	All MCs	378	2.0	378	2.0	0.667	16.6	LOS C	7.9	199.5	0.83	0.80	1.30	30.0
18	R2	All MCs	169	2.0	169	2.0	0.667	12.3	LOS B	7.9	199.5	0.83	0.80	1.30	29.8
Approach			767	2.0	767	2.0	0.667	14.4	LOS B	7.9	199.5	0.83	0.80	1.30	29.8
East: Sheldon Road															
1	L2	All MCs	188	2.0	188	2.0	0.957	45.8	LOS E	19.0	483.1	1.00	1.73	3.34	20.6
6	T1	All MCs	509	2.0	509	2.0	0.957	45.8	LOS E	19.0	483.1	1.00	1.73	3.34	20.9
16	R2	All MCs	54	2.0	54	2.0	0.074	10.0	LOS A	0.3	6.6	0.57	0.50	0.57	33.1
Approach			752	2.0	752	2.0	0.957	43.3	LOS E	19.0	483.1	0.97	1.65	3.14	21.4
North: Waterman Road															
7	L2	All MCs	38	2.0	38	2.0	0.905	44.3	LOS E	10.5	267.9	0.96	1.42	2.56	21.1
4	T1	All MCs	464	2.0	464	2.0	0.905	44.3	LOS E	10.5	267.9	0.96	1.42	2.56	21.4
14	R2	All MCs	204	2.0	204	2.0	0.368	12.0	LOS B	1.6	40.1	0.71	0.73	0.85	30.3
Approach			706	2.0	706	2.0	0.905	34.9	LOS D	10.5	267.9	0.89	1.22	2.06	23.3
West: Sheldon Road															
5	L2	All MCs	141	2.0	141	2.0	0.758	20.5	LOS C	8.4	214.6	0.93	1.08	1.76	26.7
2	T1	All MCs	311	2.0	311	2.0	0.758	20.5	LOS C	8.4	214.6	0.93	1.08	1.76	27.2
12	R2	All MCs	157	2.0	157	2.0	0.758	20.5	LOS C	8.4	214.6	0.93	1.08	1.76	27.0
Approach			608	2.0	608	2.0	0.758	20.5	LOS C	8.4	214.6	0.93	1.08	1.76	27.0
All Vehicles			2834	2.0	2834	2.0	0.957	28.5	LOS D	19.0	483.1	0.90	1.19	2.08	24.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\2_Existing Plus Project

\Summer_Villas.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon PM Peak Hour - improvement
(Site Folder: Existing Plus Project)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh Dist] veh ft		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed mph
South: Waterman Road															
3	L2	All MCs	138	1.0	138	1.0	0.732	17.6	LOS C	9.0	228.1	0.91	1.00	1.63	27.7
8	T1	All MCs	348	1.0	348	1.0	0.732	21.5	LOS C	9.0	228.1	0.91	1.00	1.63	28.2
18	R2	All MCs	166	1.0	166	1.0	0.732	17.6	LOS C	9.0	228.1	0.91	1.00	1.63	28.0
Approach			652	1.0	652	1.0	0.732	19.7	LOS C	9.0	228.1	0.91	1.00	1.63	28.1
East: Sheldon Road															
1	L2	All MCs	206	1.0	206	1.0	0.777	19.9	LOS C	10.0	253.2	0.91	1.08	1.81	26.9
6	T1	All MCs	490	1.0	490	1.0	0.777	19.9	LOS C	10.0	253.2	0.91	1.08	1.81	27.3
16	R2	All MCs	30	1.0	30	1.0	0.034	8.2	LOS A	0.1	3.1	0.50	0.40	0.50	33.8
Approach			727	1.0	727	1.0	0.777	19.5	LOS C	10.0	253.2	0.90	1.05	1.76	27.4
North: Waterman Road															
7	L2	All MCs	55	1.0	55	1.0	0.788	27.4	LOS D	7.3	184.6	0.90	1.14	1.82	25.0
4	T1	All MCs	434	1.0	434	1.0	0.788	27.4	LOS D	7.3	184.6	0.90	1.14	1.82	25.4
14	R2	All MCs	226	1.0	226	1.0	0.364	10.8	LOS B	1.6	41.2	0.69	0.69	0.81	30.8
Approach			715	1.0	715	1.0	0.788	22.2	LOS C	7.3	184.6	0.84	1.00	1.50	26.8
West: Sheldon Road															
5	L2	All MCs	127	1.0	127	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.1
2	T1	All MCs	377	1.0	377	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.6
12	R2	All MCs	170	1.0	170	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.4
Approach			674	1.0	674	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.5
All Vehicles			2768	1.0	2768	1.0	0.788	18.2	LOS C	10.0	253.2	0.86	0.96	1.53	28.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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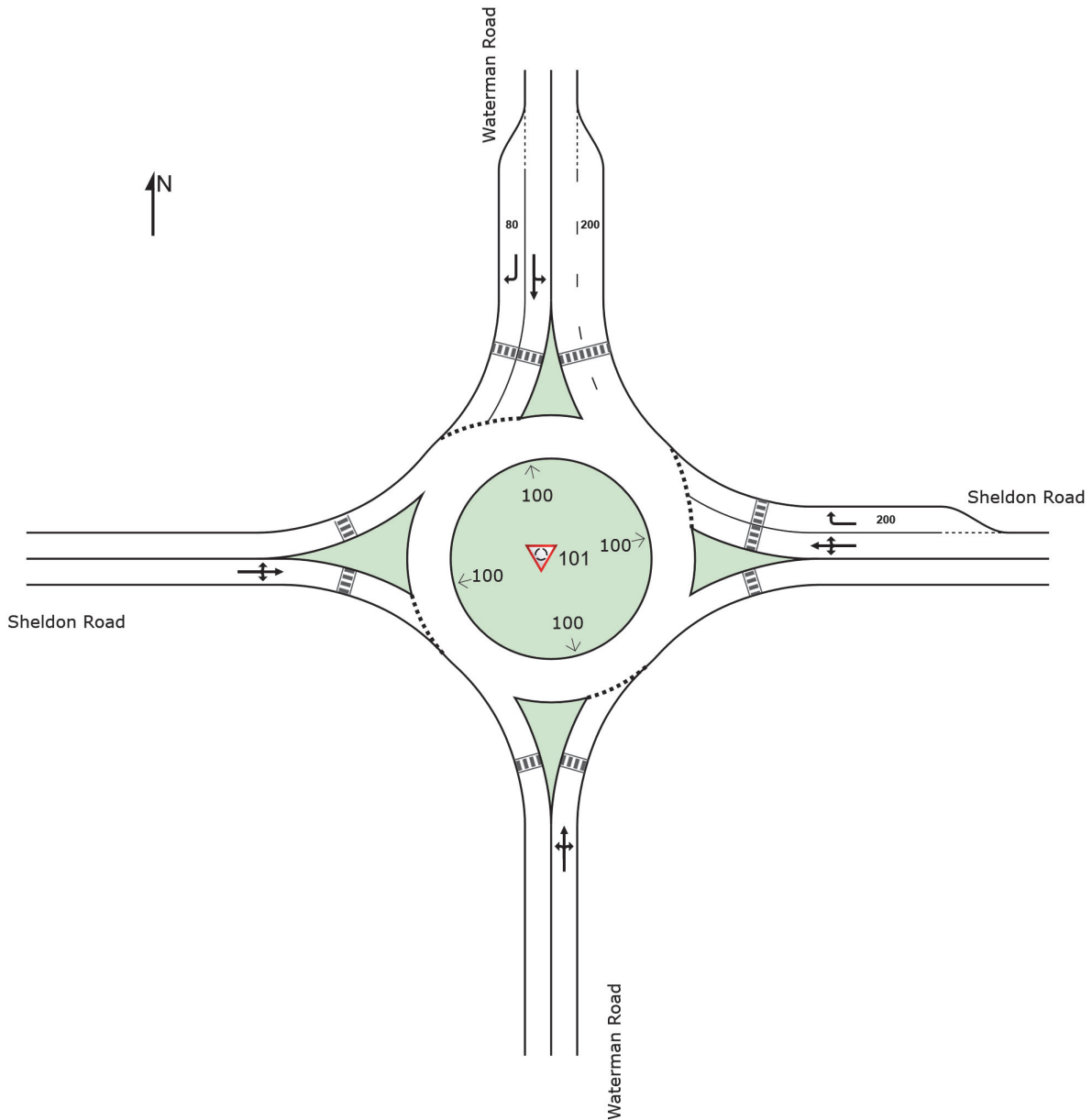
Summer_Villas.sip9

SITE LAYOUT

 **Site: 1 [Waterman & Sheldon - Improvement**
(Site Folder: EAPP)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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*Figure not OCR compatible.

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon AM Peak Hour - Improvement (Site Folder: EAPP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Waterman Road															
3	L2	All MCs	223	2.0	223	2.0	0.679	12.7	LOS B	8.3	211.2	0.84	0.82	1.34	29.3
8	T1	All MCs	386	2.0	386	2.0	0.679	17.0	LOS C	8.3	211.2	0.84	0.82	1.34	29.9
18	R2	All MCs	173	2.0	173	2.0	0.679	12.7	LOS B	8.3	211.2	0.84	0.82	1.34	29.7
Approach			782	2.0	782	2.0	0.679	14.8	LOS B	8.3	211.2	0.84	0.82	1.34	29.7
East: Sheldon Road															
1	L2	All MCs	188	2.0	188	2.0	0.969	48.6	LOS E	20.0	507.6	1.00	1.80	3.50	20.1
6	T1	All MCs	511	2.0	511	2.0	0.969	48.6	LOS E	20.0	507.6	1.00	1.80	3.50	20.4
16	R2	All MCs	54	2.0	54	2.0	0.074	10.1	LOS B	0.3	6.7	0.57	0.51	0.57	33.1
Approach			753	2.0	753	2.0	0.969	45.9	LOS E	20.0	507.6	0.97	1.70	3.29	20.9
North: Waterman Road															
7	L2	All MCs	38	2.0	38	2.0	0.909	45.0	LOS E	10.7	271.6	0.96	1.43	2.59	20.9
4	T1	All MCs	464	2.0	464	2.0	0.909	45.0	LOS E	10.7	271.6	0.96	1.43	2.59	21.2
14	R2	All MCs	205	2.0	205	2.0	0.371	12.1	LOS B	1.6	40.6	0.71	0.74	0.86	30.2
Approach			707	2.0	707	2.0	0.909	35.5	LOS E	10.7	271.6	0.89	1.23	2.09	23.2
West: Sheldon Road															
5	L2	All MCs	141	2.0	141	2.0	0.758	20.5	LOS C	8.4	214.6	0.93	1.08	1.76	26.7
2	T1	All MCs	311	2.0	311	2.0	0.758	20.5	LOS C	8.4	214.6	0.93	1.08	1.76	27.2
12	R2	All MCs	157	2.0	157	2.0	0.758	20.5	LOS C	8.4	214.6	0.93	1.08	1.76	27.0
Approach			608	2.0	608	2.0	0.758	20.5	LOS C	8.4	214.6	0.93	1.08	1.76	27.0
All Vehicles			2851	2.0	2851	2.0	0.969	29.4	LOS D	20.0	507.6	0.90	1.21	2.13	24.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon PM Peak Hour - Improvement (Site Folder: EAPP)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Waterman Road															
3	L2	All MCs	140	1.0	140	1.0	0.745	18.2	LOS C	9.5	239.8	0.92	1.02	1.68	27.5
8	T1	All MCs	355	1.0	355	1.0	0.745	22.1	LOS C	9.5	239.8	0.92	1.02	1.68	28.0
18	R2	All MCs	168	1.0	168	1.0	0.745	18.2	LOS C	9.5	239.8	0.92	1.02	1.68	27.8
Approach			662	1.0	662	1.0	0.745	20.3	LOS C	9.5	239.8	0.92	1.02	1.68	27.9
East: Sheldon Road															
1	L2	All MCs	206	1.0	206	1.0	0.785	20.6	LOS C	10.3	259.1	0.92	1.10	1.86	26.7
6	T1	All MCs	492	1.0	492	1.0	0.785	20.6	LOS C	10.3	259.1	0.92	1.10	1.86	27.1
16	R2	All MCs	30	1.0	30	1.0	0.034	8.3	LOS A	0.1	3.1	0.51	0.40	0.51	33.8
Approach			729	1.0	729	1.0	0.785	20.1	LOS C	10.3	259.1	0.90	1.07	1.80	27.2
North: Waterman Road															
7	L2	All MCs	55	1.0	55	1.0	0.791	27.7	LOS D	7.4	185.9	0.90	1.14	1.83	24.9
4	T1	All MCs	434	1.0	434	1.0	0.791	27.7	LOS D	7.4	185.9	0.90	1.14	1.83	25.3
14	R2	All MCs	228	1.0	228	1.0	0.369	11.0	LOS B	1.7	42.0	0.70	0.70	0.82	30.7
Approach			717	1.0	717	1.0	0.791	22.4	LOS C	7.4	185.9	0.84	1.00	1.51	26.7
West: Sheldon Road															
5	L2	All MCs	127	1.0	127	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.1
2	T1	All MCs	377	1.0	377	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.6
12	R2	All MCs	170	1.0	170	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.4
Approach			674	1.0	674	1.0	0.616	11.4	LOS B	5.6	140.8	0.81	0.81	1.23	30.5
All Vehicles			2783	1.0	2783	1.0	0.791	18.6	LOS C	10.3	259.1	0.87	0.98	1.56	27.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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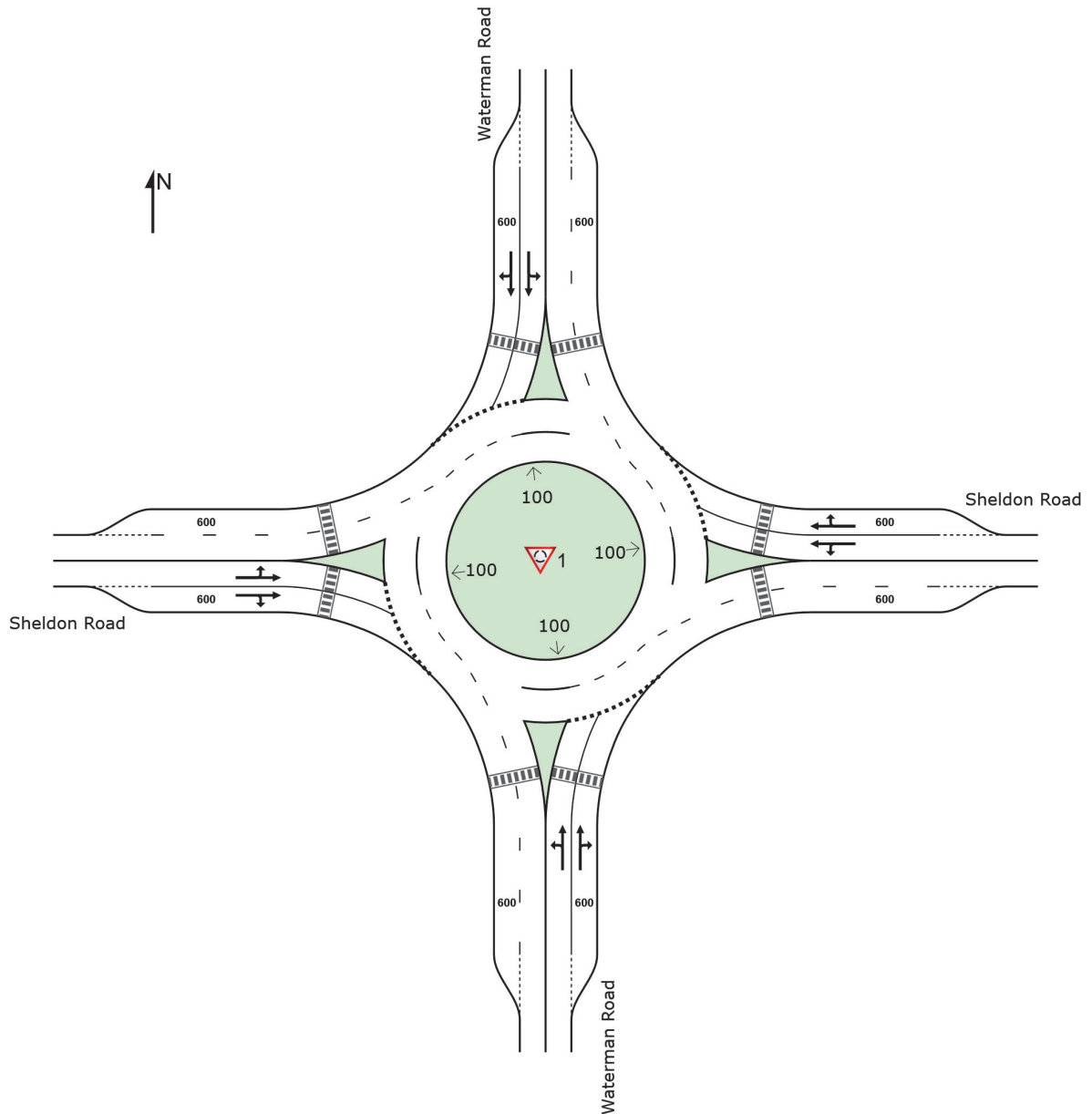
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SITE LAYOUT

 Site: 1 [Waterman & Sheldon - Improvement (Site Folder: CNP with Improvements)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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\Summer_Villas_CNP.sip9

*Figure not OCR compatible.

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon AM Peak Hour - Improvement
(Site Folder: CNP with Improvements)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				mph
			veh/h	%	veh/h	%	v/c	sec			ft				
South: Waterman Road															
3	L2	All MCs	211	2.0	211	2.0	0.428	7.9	LOS A	2.3	58.7	0.60	0.50	0.69	30.9
8	T1	All MCs	589	2.0	589	2.0	0.428	10.5	LOS B	2.3	58.7	0.59	0.48	0.67	32.2
18	R2	All MCs	168	2.0	168	2.0	0.428	11.4	LOS B	2.3	57.4	0.58	0.47	0.65	32.4
Approach			968	2.0	968	2.0	0.428	10.1	LOS B	2.3	58.7	0.59	0.48	0.67	31.9
East: Sheldon Road															
1	L2	All MCs	189	2.0	189	2.0	0.722	24.6	LOS C	5.3	133.7	0.84	1.07	1.65	25.2
6	T1	All MCs	600	2.0	600	2.0	0.722	27.6	LOS D	5.4	137.6	0.84	1.06	1.64	26.4
16	R2	All MCs	63	2.0	63	2.0	0.722	27.6	LOS D	5.4	137.6	0.84	1.06	1.64	26.7
Approach			853	2.0	853	2.0	0.722	27.0	LOS D	5.4	137.6	0.84	1.06	1.64	26.2
North: Waterman Road															
7	L2	All MCs	42	2.0	42	2.0	0.853	41.0	LOS E	7.6	193.7	0.92	1.30	2.23	21.7
4	T1	All MCs	611	2.0	611	2.0	0.853	42.2	LOS E	8.0	202.3	0.91	1.30	2.23	22.3
14	R2	All MCs	211	2.0	211	2.0	0.853	44.5	LOS E	8.0	202.3	0.91	1.30	2.23	22.6
Approach			863	2.0	863	2.0	0.853	42.7	LOS E	8.0	202.3	0.91	1.30	2.23	22.3
West: Sheldon Road															
5	L2	All MCs	147	2.0	147	2.0	0.486	12.3	LOS B	2.6	65.8	0.72	0.76	1.02	29.2
2	T1	All MCs	347	2.0	347	2.0	0.486	13.6	LOS B	2.6	66.3	0.71	0.75	1.01	30.2
12	R2	All MCs	221	2.0	221	2.0	0.486	17.6	LOS C	2.6	66.3	0.71	0.74	0.99	30.7
Approach			716	2.0	716	2.0	0.486	14.6	LOS B	2.6	66.3	0.71	0.75	1.01	30.1
All Vehicles			3400	2.0	3400	2.0	0.853	23.5	LOS C	8.0	202.3	0.76	0.89	1.38	27.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\5_Cumulative No Project

\Summer_Villas_CNP.sip9

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon PM Peak Hour - Improvement
(Site Folder: CNP with Improvements)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance																
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed	
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]					mph
South: Waterman Road																
3u	U	All MCs	2	1.0	2	1.0	0.517	11.3	LOS B	3.4	86.1	0.70	0.70	1.00	29.5	
3	L2	All MCs	204	1.0	204	1.0	0.517	11.3	LOS B	3.4	86.1	0.70	0.70	1.00	29.5	
8	T1	All MCs	516	1.0	516	1.0	0.517	13.3	LOS B	3.4	86.5	0.69	0.68	0.99	30.7	
18	R2	All MCs	183	1.0	183	1.0	0.517	15.0	LOS B	3.4	86.5	0.68	0.67	0.98	31.0	
Approach			905	1.0	905	1.0	0.517	13.2	LOS B	3.4	86.5	0.69	0.68	0.99	30.5	
East: Sheldon Road																
1	L2	All MCs	215	1.0	215	1.0	0.564	14.7	LOS B	3.5	87.8	0.76	0.85	1.19	28.2	
6	T1	All MCs	559	1.0	559	1.0	0.564	18.4	LOS C	3.5	89.3	0.75	0.83	1.18	29.7	
16	R2	All MCs	32	1.0	32	1.0	0.564	17.8	LOS C	3.5	89.3	0.75	0.83	1.17	29.9	
Approach			806	1.0	806	1.0	0.564	17.4	LOS C	3.5	89.3	0.75	0.84	1.18	29.3	
North: Waterman Road																
7	L2	All MCs	43	1.0	43	1.0	0.817	35.2	LOS E	7.0	177.4	0.89	1.23	2.03	23.0	
4	T1	All MCs	602	1.0	602	1.0	0.817	36.4	LOS E	7.3	185.2	0.89	1.22	2.03	23.6	
14	R2	All MCs	226	1.0	226	1.0	0.817	38.7	LOS E	7.3	185.2	0.89	1.22	2.04	23.9	
Approach			871	1.0	871	1.0	0.817	36.9	LOS E	7.3	185.2	0.89	1.22	2.03	23.6	
West: Sheldon Road																
5	L2	All MCs	129	1.0	129	1.0	0.383	7.9	LOS A	1.8	45.8	0.65	0.61	0.76	31.1	
2	T1	All MCs	441	1.0	441	1.0	0.383	9.7	LOS A	1.8	45.8	0.64	0.60	0.75	32.2	
12	R2	All MCs	204	1.0	204	1.0	0.383	13.4	LOS B	1.8	45.4	0.63	0.58	0.73	32.4	
Approach			774	1.0	774	1.0	0.383	10.4	LOS B	1.8	45.8	0.64	0.59	0.75	32.0	
All Vehicles			3357	1.0	3357	1.0	0.817	19.7	LOS C	7.3	185.2	0.75	0.84	1.25	28.4	

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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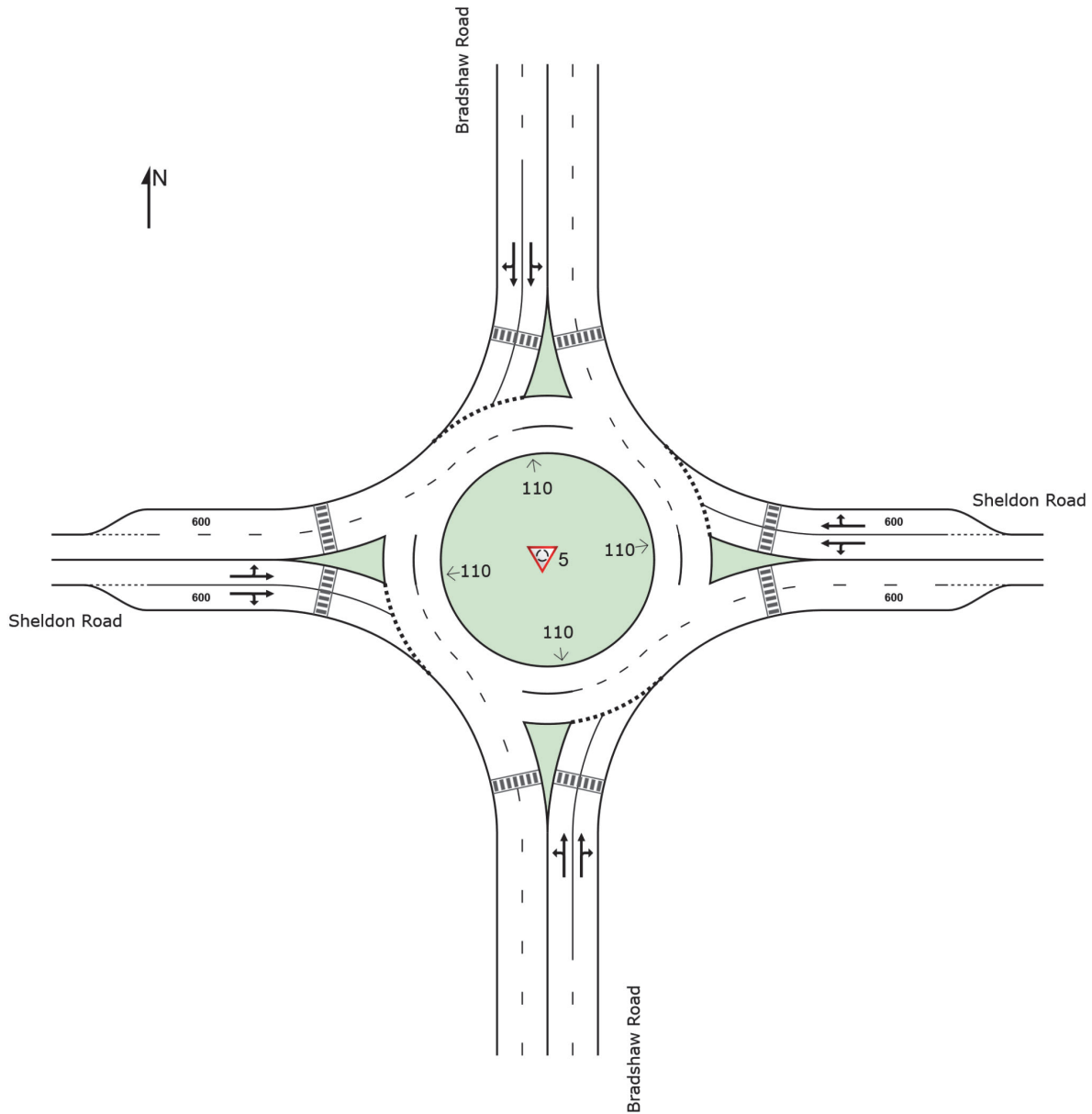
Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\5_Cumulative No Project
\Summer_Villas_CNP.sip9

SITE LAYOUT

 Site: 5 [Bradshaw & Sheldon - Improvement (Site Folder: CNP with Improvements)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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\Summer_Villas_CNP.sip9

*Figure not OCR compatible.

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon AM Peak Hour - Improvement
(Site Folder: CNP with Improvements)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Bradshaw Road															
3	L2	All MCs	226	3.0	226	3.0	0.755	14.7	LOS B	11.3	288.6	0.86	0.95	1.63	28.8
8	T1	All MCs	1548	3.0	1548	3.0	0.755	14.3	LOS B	11.6	297.2	0.85	0.94	1.62	29.7
18	R2	All MCs	183	3.0	183	3.0	0.755	17.6	LOS C	11.6	297.2	0.85	0.93	1.60	29.8
Approach			1957	3.0	1957	3.0	0.755	14.7	LOS B	11.6	297.2	0.86	0.94	1.62	29.6
East: Sheldon Road															
1	L2	All MCs	215	3.0	215	3.0	1.045	120.0	LOS F	9.1	232.9	1.00	1.62	3.58	12.3
6	T1	All MCs	226	3.0	226	3.0	1.045	117.3	LOS F	9.8	251.1	1.00	1.70	3.86	13.1
16	R2	All MCs	32	3.0	32	3.0	1.045	116.9	LOS F	9.8	251.1	1.00	1.70	3.86	13.1
Approach			473	3.0	473	3.0	1.045	118.5	LOS F	9.8	251.1	1.00	1.66	3.73	12.7
North: Bradshaw Road															
7	L2	All MCs	48	3.0	48	3.0	0.771	16.5	LOS C	10.6	270.4	0.89	1.05	1.79	28.5
4	T1	All MCs	1333	3.0	1333	3.0	0.771	16.1	LOS C	10.9	280.3	0.89	1.04	1.78	29.2
14	R2	All MCs	462	3.0	462	3.0	0.771	21.8	LOS C	10.9	280.3	0.88	1.03	1.77	29.1
Approach			1844	3.0	1844	3.0	0.771	17.5	LOS C	10.9	280.3	0.89	1.04	1.78	29.1
West: Sheldon Road															
5	L2	All MCs	290	3.0	290	3.0	0.691	27.7	LOS D	3.1	80.5	0.88	1.04	1.46	23.9
2	T1	All MCs	183	3.0	183	3.0	0.691	33.9	LOS D	3.1	80.5	0.89	1.05	1.47	24.4
12	R2	All MCs	97	3.0	97	3.0	0.691	31.6	LOS D	3.1	78.2	0.89	1.05	1.47	24.3
Approach			570	3.0	570	3.0	0.691	30.3	LOS D	3.1	80.5	0.89	1.04	1.46	24.1
All Vehicles			4844	3.0	4844	3.0	1.045	27.7	LOS D	11.6	297.2	0.88	1.06	1.87	25.4

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\5_Cumulative No Project

\Summer_Villas_CNP.sip9

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon PM Peak Hour - Improvement
(Site Folder: CNP with Improvements)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Bradshaw Road															
3	L2	All MCs	69	3.0	69	3.0	0.780	20.8	LOS C	9.9	253.4	0.90	1.09	1.84	27.0
8	T1	All MCs	1172	3.0	1172	3.0	0.780	20.2	LOS C	10.3	262.5	0.90	1.08	1.84	27.7
18	R2	All MCs	161	3.0	161	3.0	0.780	23.6	LOS C	10.3	262.5	0.89	1.07	1.83	27.8
Approach			1402	3.0	1402	3.0	0.780	20.6	LOS C	10.3	262.5	0.90	1.08	1.84	27.7
East: Sheldon Road															
1	L2	All MCs	69	3.0	69	3.0	1.312	232.2	LOS F	19.0	486.7	1.00	2.06	5.40	7.8
6	T1	All MCs	322	3.0	322	3.0	1.312	227.7	LOS F	22.2	569.0	1.00	2.17	5.83	8.0
16	R2	All MCs	46	3.0	46	3.0	1.312	220.3	LOS F	22.2	569.0	1.00	2.25	6.11	8.1
Approach			437	3.0	437	3.0	1.312	227.7	LOS F	22.2	569.0	1.00	2.16	5.79	7.9
North: Bradshaw Road															
7	L2	All MCs	52	3.0	52	3.0	0.713	12.5	LOS B	10.7	274.4	0.77	0.74	1.28	30.0
4	T1	All MCs	1391	3.0	1391	3.0	0.713	12.3	LOS B	10.8	277.1	0.77	0.73	1.27	30.7
14	R2	All MCs	517	3.0	517	3.0	0.713	17.8	LOS C	10.8	277.1	0.75	0.71	1.24	30.5
Approach			1960	3.0	1960	3.0	0.713	13.7	LOS B	10.8	277.1	0.76	0.73	1.26	30.6
West: Sheldon Road															
5	L2	All MCs	218	3.0	218	3.0	0.804	41.1	LOS E	4.4	113.5	0.93	1.18	1.87	21.2
2	T1	All MCs	310	3.0	310	3.0	0.804	41.1	LOS E	4.6	118.6	0.92	1.18	1.87	22.5
12	R2	All MCs	149	3.0	149	3.0	0.804	36.9	LOS E	4.6	118.6	0.92	1.18	1.86	22.8
Approach			678	3.0	678	3.0	0.804	40.2	LOS E	4.6	118.6	0.92	1.18	1.87	22.1
All Vehicles			4477	3.0	4477	3.0	1.312	40.8	LOS E	22.2	569.0	0.85	1.05	1.97	22.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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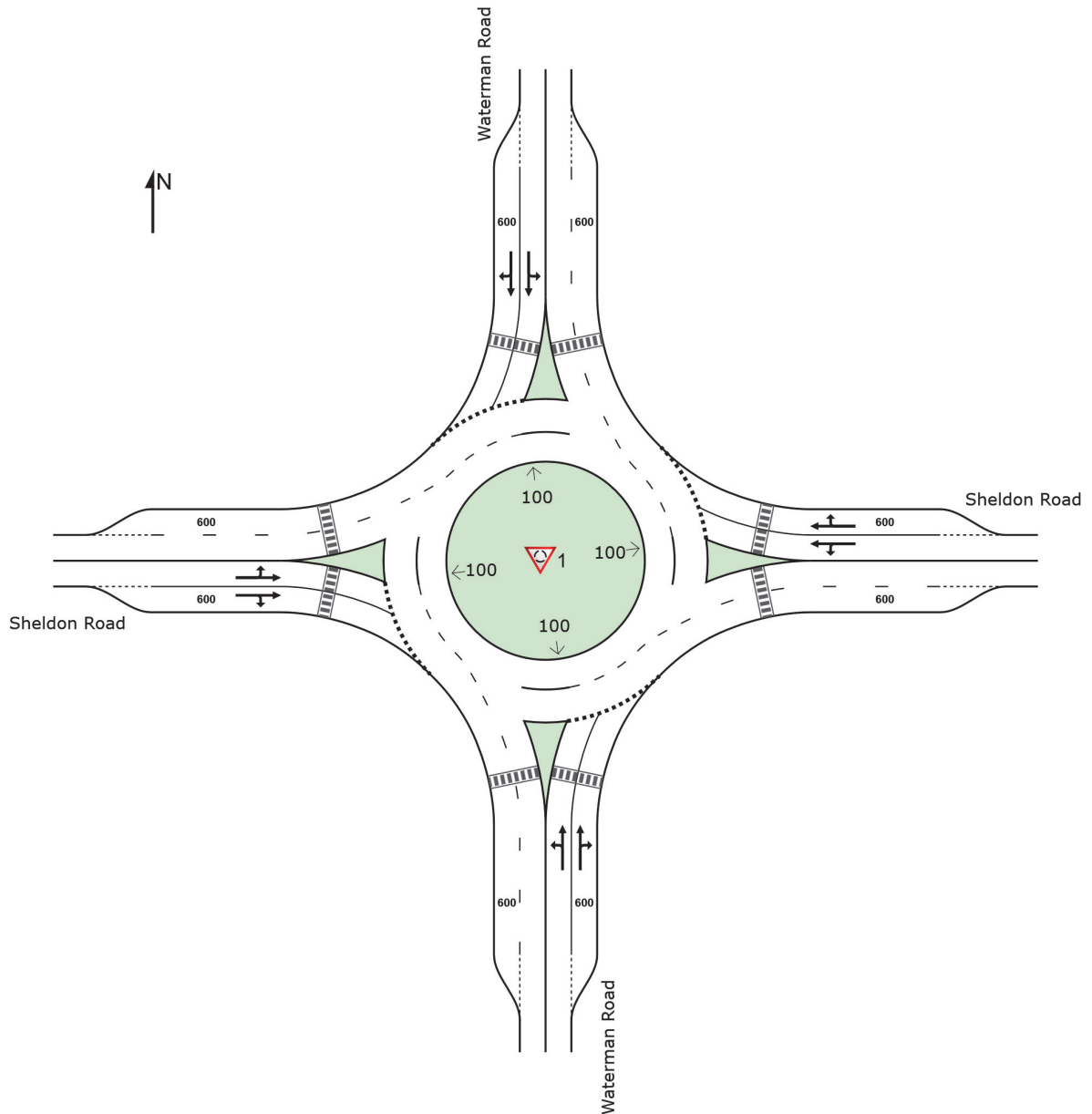
\Summer_Villas_CNP.sip9

SITE LAYOUT

 **Site: 1 [Waterman & Sheldon - Improvement (Site Folder: CPP with Improvements)]**

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Summer_Villas_.sip9

*Figure not OCR compatible.

MOVEMENT SUMMARY

 **Site: 1 [Waterman & Sheldon AM Peak Hour - Improvement
(Site Folder: CPP with Improvements)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Waterman Road															
3	L2	All MCs	221	2.0	221	2.0	0.446	8.2	LOS A	2.5	64.7	0.62	0.53	0.75	30.7
8	T1	All MCs	600	2.0	600	2.0	0.446	11.0	LOS B	2.5	64.7	0.61	0.51	0.73	32.0
18	R2	All MCs	177	2.0	177	2.0	0.446	11.8	LOS B	2.5	63.7	0.60	0.50	0.71	32.3
Approach			998	2.0	998	2.0	0.446	10.5	LOS B	2.5	64.7	0.61	0.51	0.73	31.8
East: Sheldon Road															
1	L2	All MCs	211	2.0	211	2.0	0.834	34.8	LOS D	7.8	198.5	0.90	1.27	2.18	22.7
6	T1	All MCs	662	2.0	662	2.0	0.834	37.7	LOS E	8.1	206.8	0.91	1.27	2.18	23.7
16	R2	All MCs	94	2.0	94	2.0	0.834	37.4	LOS E	8.1	206.8	0.91	1.27	2.19	24.0
Approach			966	2.0	966	2.0	0.834	37.0	LOS E	8.1	206.8	0.91	1.27	2.18	23.5
North: Waterman Road															
7	L2	All MCs	47	2.0	47	2.0	0.942	59.3	LOS F	10.4	263.3	0.97	1.53	2.97	18.5
4	T1	All MCs	613	2.0	613	2.0	0.942	60.2	LOS F	11.0	279.1	0.97	1.54	2.99	19.0
14	R2	All MCs	211	2.0	211	2.0	0.942	62.4	LOS F	11.0	279.1	0.97	1.56	3.03	19.2
Approach			871	2.0	871	2.0	0.942	60.7	LOS F	11.0	279.1	0.97	1.54	3.00	19.0
West: Sheldon Road															
5	L2	All MCs	147	2.0	147	2.0	0.506	13.0	LOS B	2.7	69.4	0.73	0.79	1.06	29.0
2	T1	All MCs	357	2.0	357	2.0	0.506	14.4	LOS B	2.8	70.2	0.73	0.78	1.05	30.0
12	R2	All MCs	223	2.0	223	2.0	0.506	18.4	LOS C	2.8	70.2	0.72	0.77	1.04	30.4
Approach			727	2.0	727	2.0	0.506	15.4	LOS C	2.8	70.2	0.73	0.78	1.05	29.9
All Vehicles			3562	2.0	3562	2.0	0.942	31.0	LOS D	11.0	279.1	0.80	1.03	1.74	25.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\SA-Projects\SA23\0206.00_Elk_Grove_Summer_Villas_EIR\Analysis\Sidra\6_Cumulative Plus Project

Summer_Villas_.sip9

MOVEMENT SUMMARY

 **Site: 101 [Waterman & Sheldon PM Peak Hour - Improvement
(Site Folder: CPP with Improvements)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Waterman Road															
3	L2	All MCs	208	1.0	208	1.0	0.736	18.3	LOS C	7.8	196.3	0.85	1.01	1.66	27.3
8	T1	All MCs	519	1.0	519	1.0	0.736	17.3	LOS C	7.8	196.3	0.82	0.94	1.50	28.4
18	R2	All MCs	198	1.0	198	1.0	0.373	13.4	LOS B	1.7	44.0	0.64	0.60	0.75	31.6
Approach			925	1.0	925	1.0	0.736	16.7	LOS C	7.8	196.3	0.79	0.88	1.37	28.8
East: Sheldon Road															
1	L2	All MCs	223	1.0	223	1.0	0.776	22.9	LOS C	7.6	190.7	0.88	1.12	1.83	25.9
6	T1	All MCs	581	1.0	581	1.0	0.776	20.5	LOS C	7.6	190.7	0.81	0.96	1.46	28.0
16	R2	All MCs	43	1.0	43	1.0	0.393	14.3	LOS B	1.8	45.8	0.69	0.70	0.86	31.0
Approach			846	1.0	846	1.0	0.776	20.8	LOS C	7.6	190.7	0.82	0.98	1.52	27.5
North: Waterman Road															
7	L2	All MCs	71	1.0	71	1.0	1.142	107.5	LOS F	35.1	885.2	1.00	2.75	6.96	13.3
4	T1	All MCs	612	1.0	612	1.0	1.142	100.0	LOS F	35.1	885.2	0.98	2.58	6.44	14.1
14	R2	All MCs	226	1.0	226	1.0	0.578	25.7	LOS D	3.1	78.3	0.79	0.92	1.25	27.5
Approach			909	1.0	909	1.0	1.142	82.1	LOS F	35.1	885.2	0.94	2.18	5.19	15.9
West: Sheldon Road															
5	L2	All MCs	129	1.0	129	1.0	0.531	9.6	LOS A	3.5	87.1	0.70	0.71	1.01	30.7
2	T1	All MCs	498	1.0	498	1.0	0.531	9.7	LOS A	3.5	87.1	0.69	0.69	0.97	31.4
12	R2	All MCs	214	1.0	214	1.0	0.269	11.4	LOS B	1.1	27.0	0.59	0.52	0.59	32.9
Approach			841	1.0	841	1.0	0.531	10.1	LOS B	3.5	87.1	0.67	0.65	0.88	31.7
All Vehicles			3520	1.0	3520	1.0	1.142	33.0	LOS D	35.1	885.2	0.81	1.19	2.28	24.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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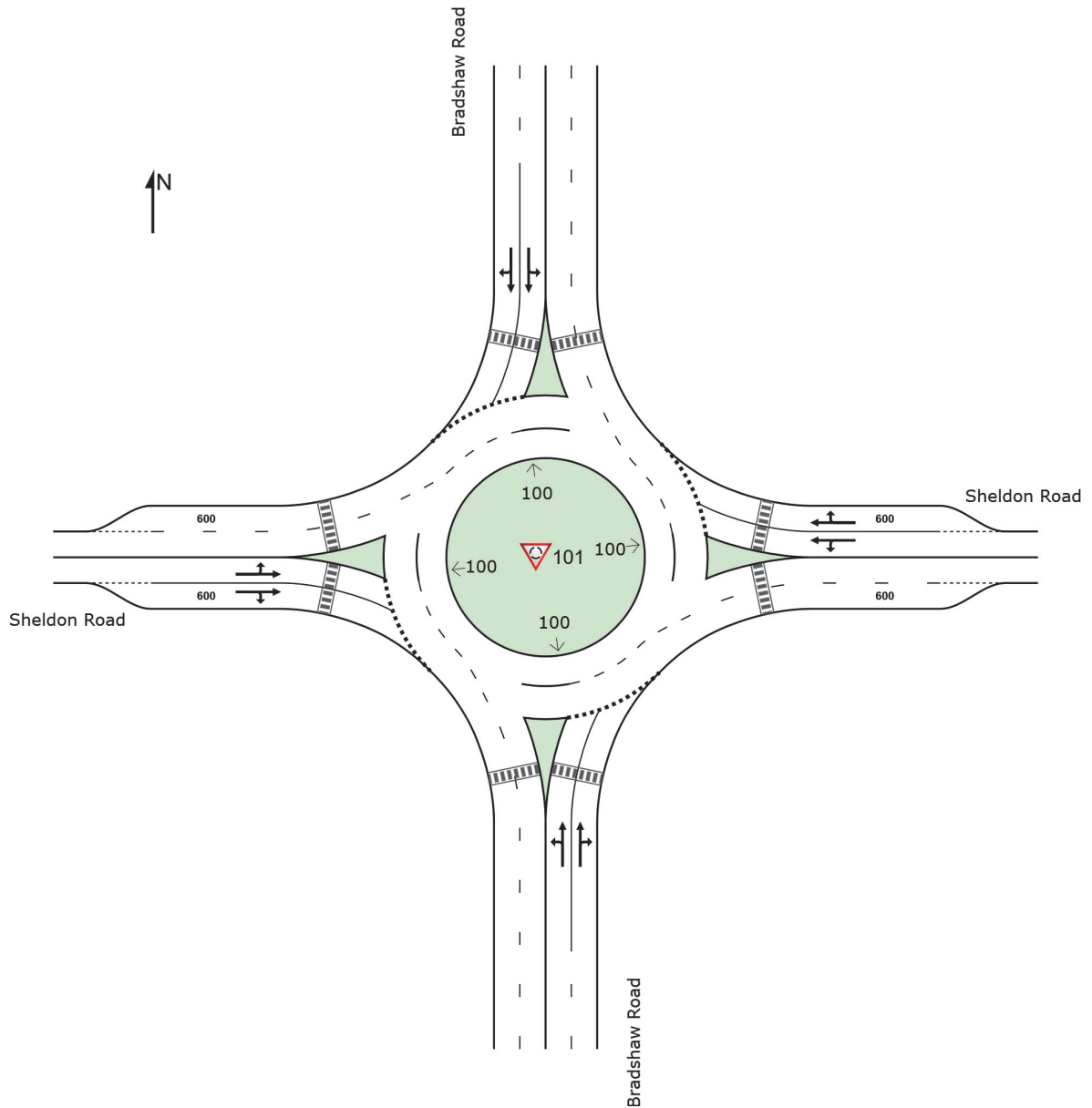
Summer_Villas_.sip9

SITE LAYOUT

 **Site: 5 [Bradshaw & Sheldon - Improvement (Site Folder: CPP with Improvements)]**

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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*Figure not OCR compatible.

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon AM Peak Hour - Improvement
(Site Folder: CPP with Improvements)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Bradshaw Road															
3	L2	All MCs	226	3.0	226	3.0	0.771	15.7	LOS C	11.7	298.9	0.89	1.00	1.73	28.3
8	T1	All MCs	1548	3.0	1548	3.0	0.771	15.2	LOS C	12.1	308.9	0.88	0.99	1.71	29.2
18	R2	All MCs	183	3.0	183	3.0	0.771	18.5	LOS C	12.1	308.9	0.87	0.98	1.70	29.3
Approach			1957	3.0	1957	3.0	0.771	15.6	LOS C	12.1	308.9	0.88	0.99	1.71	29.1
East: Sheldon Road															
1	L2	All MCs	215	3.0	215	3.0	1.064	126.5	LOS F	9.8	252.0	1.00	1.67	3.78	11.9
6	T1	All MCs	227	3.0	227	3.0	1.064	123.7	LOS F	10.7	273.9	1.00	1.76	4.11	12.6
16	R2	All MCs	32	3.0	32	3.0	1.064	123.6	LOS F	10.7	273.9	1.00	1.76	4.11	12.6
Approach			474	3.0	474	3.0	1.064	124.9	LOS F	10.7	273.9	1.00	1.72	3.96	12.3
North: Bradshaw Road															
7	L2	All MCs	48	3.0	48	3.0	0.769	16.3	LOS C	10.5	269.9	0.89	1.04	1.78	28.5
4	T1	All MCs	1333	3.0	1333	3.0	0.769	15.9	LOS C	10.9	279.5	0.88	1.03	1.77	29.1
14	R2	All MCs	466	3.0	466	3.0	0.769	21.7	LOS C	10.9	279.5	0.88	1.02	1.75	29.1
Approach			1847	3.0	1847	3.0	0.769	17.4	LOS C	10.9	279.5	0.88	1.03	1.77	29.1
West: Sheldon Road															
5	L2	All MCs	310	3.0	310	3.0	0.725	30.1	LOS D	3.5	88.9	0.89	1.07	1.55	23.3
2	T1	All MCs	191	3.0	191	3.0	0.725	36.7	LOS E	3.5	88.9	0.90	1.08	1.56	23.7
12	R2	All MCs	99	3.0	99	3.0	0.725	34.2	LOS D	3.4	86.1	0.90	1.08	1.56	23.5
Approach			600	3.0	600	3.0	0.725	32.9	LOS D	3.5	88.9	0.90	1.07	1.55	23.4
All Vehicles			4878	3.0	4878	3.0	1.064	29.0	LOS D	12.1	308.9	0.89	1.09	1.93	25.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Summer_Villas_.sip9

MOVEMENT SUMMARY

 **Site: 5 [Bradshaw & Sheldon PM Peak Hour - Improvement
(Site Folder: CPP with Improvements)]**

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]	ft			mph
South: Bradshaw Road															
3	L2	All MCs	71	3.0	71	3.0	0.789	21.5	LOS C	10.1	259.0	0.91	1.11	1.89	26.6
8	T1	All MCs	1172	3.0	1172	3.0	0.789	20.9	LOS C	10.5	268.6	0.91	1.10	1.88	27.3
18	R2	All MCs	161	3.0	161	3.0	0.789	24.3	LOS C	10.5	268.6	0.90	1.09	1.88	27.4
Approach			1405	3.0	1405	3.0	0.789	21.3	LOS C	10.5	268.6	0.91	1.10	1.88	27.3
East: Sheldon Road															
1	L2	All MCs	69	3.0	69	3.0	1.347	246.1	LOS F	20.5	524.7	1.00	2.12	5.65	7.4
6	T1	All MCs	330	3.0	330	3.0	1.347	241.8	LOS F	23.9	611.6	1.00	2.24	6.10	7.6
16	R2	All MCs	46	3.0	46	3.0	1.347	234.4	LOS F	23.9	611.6	1.00	2.32	6.41	7.7
Approach			445	3.0	445	3.0	1.347	241.7	LOS F	23.9	611.6	1.00	2.23	6.07	7.6
North: Bradshaw Road															
7	L2	All MCs	52	3.0	52	3.0	0.720	12.7	LOS B	11.1	284.4	0.78	0.76	1.31	29.8
4	T1	All MCs	1391	3.0	1391	3.0	0.720	12.5	LOS B	11.2	287.6	0.77	0.75	1.30	30.4
14	R2	All MCs	536	3.0	536	3.0	0.720	18.2	LOS C	11.2	287.6	0.76	0.73	1.27	30.3
Approach			1978	3.0	1978	3.0	0.720	14.0	LOS B	11.2	287.6	0.77	0.74	1.29	30.4
West: Sheldon Road															
5	L2	All MCs	225	3.0	225	3.0	0.817	42.6	LOS E	4.6	118.4	0.93	1.20	1.92	20.9
2	T1	All MCs	314	3.0	314	3.0	0.817	42.6	LOS E	4.8	123.8	0.92	1.20	1.92	22.1
12	R2	All MCs	151	3.0	151	3.0	0.817	38.3	LOS E	4.8	123.8	0.92	1.19	1.92	22.5
Approach			690	3.0	690	3.0	0.817	41.6	LOS E	4.8	123.8	0.92	1.20	1.92	21.8
All Vehicles			4517	3.0	4517	3.0	1.347	42.9	LOS E	23.9	611.6	0.86	1.07	2.04	21.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Sign Control.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: HCM Delay Formula (Stopline Delay: Geometric Delay is not included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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